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BELL TELEPHONE LABORATORIES, INCORPORATED

3-96

COMMON SYSTEMS
FOR USE WITH NO. 3 ESS
ARRANGED WITH 2-WIRE FEATURES
COMMON SYSTEM SUBROUTINES
(CSYSUB)

ISSUE 5
02/06/81

AT&TCO
SPCS

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SECTION DICTIONARY

NUMBER	NAME	MAXIMUM	ORIGIN	TYP	ADDRESS-MODIFICATION
01	CSYSUB	0001432		C	
02	CPATCH	0000474		C	
03	CPATCH1	0000000		C	
04	CPATCH2	0000000		C	
05	CPATCH3	0000162		C	
06	CPATCH7	0000000		C	
07	TFAPCH2	0000000		C	
08	TPATCH	0000000		C	

```
                                 01        DBNAM   NO33E3I3.OFF.DATABASE
                                 02        RELNAM  NO3ESS
                                 03        GETLIB  LIBRARY,MEMBER=MOPTBL
                                 04        GETLIB  LIBRARY,MEMBER=SYSMAC
                                 05        GETLIB  LIBRARY,MEMBER=SYSSYM
                                 06        GETLIB  LIBRARY,MEMBER=PATCH2
0110000                          07        FIRSTOPTSS
0110000                          08        VERSION 3ACC,FIELD,ESS2E
0110000                          09        PATCHINIT
                                 10 NO33E3I3.OFF.OPMS(0) DECK
                                 11        DSQUAL  NO33E3I3
                                 12        LISTING N,CRUNCH=Y,SYSOUT=N
                                 13 ##################
                                 14 ##
                                 15 ## UNIX ID = NO3PAG
                                 16 ##
                                 17 ##################
                                 18 ################################################
                                 19 ###
                                 20 ####  pid  date     time   rel
                                 21 ###
                                 22 #### csysub 1/24/81 18:10:41 7.1.1.1
                                 23 ###
                                 24 ################################################
                                 25        NAME    CSYSUB


                                 29 ## The following is a list of the valid csects for program CSYSUB

0110000                          31 CSYSUB CSECT


                                 34 ## The following csects are necessary for patching

0111432                          36 CPATCH CSECT
0112562                          37 CPATCH1 CSECT
0114107                          38 CPATCH2 CSECT
0115073                          39 CPATCH3 CSECT
0121236                          40 CPATCH7 CSECT

0116774                          42 TFAPCH2 CSECT

0600000                          44 TPATCH CSECT
```

```
                        01        GETLIB  MEMBER=GPMAC
                        02        GETLIB  MEMBER=CCSYM
                        03        GETLIB  MEMBER=TTYMAC
                        04        GETLIB  MEMBER=TTYSYM
                        05        GETLIB  MEMBER=BSAIMAC
                        06        GETLIB  MEMBER=CTVTAB
                        07 TOPTTL TEXT    '3A-CC COMMON SYSTEM INTERFACES'
                        08 BOTTTL TEXT    'X-74292 THRU X-74298          IV-C MAY,1973'
                        09 PRINT  MEMOINIT DELETE=NO
0000000                 10 CIPLTRK EQU    0
0000023                 11 S(CIPLTRK) EQU 19
0000000                 12 PRIV   EQU     0
0000020                 13 S(PRIV) EQU    16
```

```
01 # THE CSYSUB ASSEMBLY UNIT CONTAINS A COLLECTION OF COMMON SYSTEM
02 # SUBROUTINES.
03 # EACH SUBROUTINE PERFORMS AN EXPLICIT FUNCTION AND IN GENERAL DOES NOT HAVE ANY
04 # RELATIONSHIP TO ANY OTHER SUBROUTINE. THE FUNCTIONS PERFORMED ARE EITHER
05 # VERY COMMON OR RELATED TO CONTROLLING SYSTEM HARDWARE. THE CRITERIA FOR
06 # INCLUSION IN THIS ASSEMBLY UNIT IS THAT THE SUBROUTINE WILL
07 # BE USED BY MORE THAN ONE PROGRAM AND USUALLY BY MANY PROGRAMS.
08
09 # EACH SUBROUTINE BEGINS AT THE TOP OF A PAGE WITH DESCRIPTIVE INFORMATION.
10 # EACH PREAMBLE OF THIS TYPE WILL CONTAIN AT LEAST FOUR SECTIONS ENTITLED
11 # 'DESCRIPTION,''ENTRY POINT(S),''ENTRY CONDITIONS,' AND 'EXIT CONDITIONS.' IN
12 # SOME CASES, A FIFTH SECTION ENTITLED 'RESTRICTIONS' IS INCLUDED. THE BODY OF
13 # THE SUBROUTINE THEN FOLLOWS CONTAINING COMMENTS AS NECESSARY TO EXPLAIN THE
14 # IMPLEMENTATION OF THE FUNCTION.
```

```
01        PUBLIC  ADD16
02        PUBLIC  ADD20
03        PUBLIC  BCDXBIN
04        PUBLIC  BINXBCD
05        PUBLIC  CLR_16
06        PUBLIC  CLR_WRDS
07        PUBLIC  CMPR20
08        PUBLIC  EXCMCH
09        PUBLIC  EXCMCHO
10        PUBLIC  EXCOFLMG
11        PUBLIC  EXCOFLPG
12        PUBLIC  GET_OTS
13        PUBLIC  INIT_OCC
14        PUBLIC  INITST
15        PUBLIC  INITSTH
16        PUBLIC  INITOST
17        PUBLIC  INSYNC
18        PUBLIC  INTCHK
19        PUBLIC  INTBEGIN
20        PUBLIC  INTBGNX
21        PUBLIC  INTEND
22        PUBLIC  PIERIN
23        PUBLIC  LODIOC
24        PUBLIC  LODMCH
25        PUBLIC  L2_2
26        PUBLIC  L2_3
27        PUBLIC  L2_4
28        PUBLIC  L2_5
29        PUBLIC  L2_6
30        PUBLIC  L2_7
31        PUBLIC  L2_8
32        PUBLIC  L2_9
33        PUBLIC  L2_10
34        PUBLIC  L2_11
35        PUBLIC  L2_12
36        PUBLIC  L2_13
37        PUBLIC  L2_V
38        PUBLIC  MOVST
39        PUBLIC  REPT_ERR
40        PUBLIC  RGCHK32
41        PUBLIC  RGCHKADR
42        PUBLIC  SBUMCH
43        PUBLIC  SENDIO
44        PUBLIC  SENDIOS
45        PUBLIC  SENDMIO
46        PUBLIC  SENDMIOS
47        PUBLIC  SIO
48        PUBLIC  SLDMCHB
49        PUBLIC  SLDMIRL
```

```
01        PUBLIC  SMCH
02        PUBLIC  SMIO
03        PUBLIC  STPSTUPD
04        PUBLIC  ST2_2
05        PUBLIC  ST2_3
06        PUBLIC  ST2_4
07        PUBLIC  ST2_5
08        PUBLIC  ST2_6
09        PUBLIC  ST2_7
10        PUBLIC  ST2_8
11        PUBLIC  ST2_9
12        PUBLIC  ST2_10
13        PUBLIC  ST2_11
14        PUBLIC  ST2_12
15        PUBLIC  ST2_13
16        PUBLIC  ST2_V
17        PUBLIC  SUB16
18        PUBLIC  SUB20
19        PUBLIC  TENZERO
20        PUBLIC  TESTIO
21        PUBLIC  TIMCHK
22        PUBLIC  TIMOUT
23        PUBLIC  TIMOUTX
24        PUBLIC  UNLODIOC
25        PUBLIC  UNLODMCH
26        PUBLIC  UNWPOST
27        PUBLIC  UNWPST
28        PUBLIC  UPD_OTS
29        PUBLIC  WPST
30        PUBLIC  WPOST
31        PUBLIC  WRT_PTRN
32        PUBLIC  ZEROTEN
33        PUBLIC  ZERO_TS
```

```
01 # APPLICATION EXTERNS TO BLMMA,INITA,TDATA,TTYAPP,TTYTBL, AND  MASACS APPEAR
     FIRST.

04          EXTERN  HGAREA              # BASE ADDRESS OF HOLD-GET AREA

06 BLMMA    EXTERN  PTRESET             # CONSTANT USED TO PRESET PT (SYMBOL)

08 TDATA    EXTERN  LSTTSWRD            # ADDRESS OF HIGHEST TS WORD (TABLE)
09 TDATA    EXTERN  STRLIM              # DEFINITION OF HIGHEST EQUIPPED MAS ADDR
                                          (TABLE)
11 TDATA    EXTERN  WPTBL               # DEFINITION OF PROTECTED MAS (TABLE)

13 MASACS   EXTERN  MASOFFON            # MOVE CONTENTS OF OMAS TO MAS (SUBR)
14 MASACS   EXTERN  MASONOFF            # MOVE CONTENTS OF MAS TO OMAS (SUBR)
15 MASACS   EXTERN  MAS_ZERO            # ZERO AREA OF MAS (SUBR)
16 MASACS   EXTERN  MASCIOSC            # DEFINITION OF MASC IO ADDRESSES



22 CBLM     EXTERN  STOPPSAU
23 CBLM     EXTERN  MAS_OOS
24 CBLM     EXTERN  MCH_OOS



30 CTSD     EXTERN  IM_IMAGE
31 CTSD     EXTERN  INTRCORD
32 CTSD     EXTERN  INTCNT
33 CTSD     EXTERN  MCHFCN
34 CTSD     EXTERN  SYSTATE
35 CTSD     EXTERN  SYSTIM



41 CINIT    EXTERN  ERPMCH
42 CINIT    EXTERN  ERRPRTCK
43 CINIT    EXTERN  OFL_HG
44 CINIT    EXTERN  OFL_IM
```

```
                                01 MNST   OPSET   MAINSECT
                                02  MACRO
        MAINSECT                03        MAINSECT
                                04 MN MSET STR(K.SYSLIN-K.SYSLST,99,SYSLIN)
                                05  MNST MN
                                06  SECTTL 2,MN
                                07  MEND
                                08 MAINSECT OPRSW 16              # DO NOT PRINT IN LISTING
```

```
                        01 # INTBEGIN AND INTEND SUBROUTINES
0000004                 02 CFSAVR EQUR    R4

                        04 # WPST AND WPOST SUBROUTINES
0000005                 05 OFLSTR EQUR    R5

                        07 # SENDIO SUBROUTINES
0000001                 08 IOMSGR EQUR    R1

                        10 # UPD_OTS,GET_OTS, AND ZERO_TS SUBROUTINES
0000014                 11 STBLKR EQUR    R12

                        13 # EXCMCH AND EXCMCHO SUBROUTINES
0000002                 14 MCHORDER EQUR  R2
```

DATA DEFINITION 0:40:27 2/06/81 ****

CSYSUB W77D

```
                                    01 CFSAVR LAYOUT                  # USED BY INTBEGIN AND INTEND SUBROUTINES
                                    02 CFSAV  ITEM    1               # POSITION OF SAVED CF IN INTERRUPT
                                    03        LOEND
CFSAVR                         -003- 04 #
001 |                                                                                                                  | CFSAV |
    |******************************************************************************************************************|-------|
    | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

                                    15 OFLSTR LAYOUT                  # MEMORY FOR SUBROUTINES WPST AND WPOST
                                    16 OFLSTINIT ITEM 1               # OFLSTINIT=0 MEANS ENTRY POINT WAS WPST
                               -002- 17 #*#*#*#*#*#*# OFLSTINIT WILL APPEAR AS OFLSTIN IN PICTURES
0600000Q                            18                                # OFLSTINIT=1 MEANS ENTRY POINT WAS WPOST
                                    19 INITSTO ITEM   1               # INITSTO=1 MEANS ENTRY POINT WAS INITST
                                    20 INITH  ITEM    1               # INITH=1 MEANS ENTRY POINT WAS INITSTH
                                    21        LOEND
OFLSTR                         -003- 22 #
001 |                                                                                                  | INITH |INITSTO|OFLSTIN|
    |**************************************************************************************************|-------|-------|-------|
    | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

                                    33 IOMSGR LAYOUT                  # MEMORY FOR SUBROUTINES TESTIOX
                                    34 MTCIO  ITEM    1               # MTC MESSAGE IS BEING SENT
                                    35 SPLIO  ITEM    1               # SPECIAL IO,MTC RESPONSE SHOULD NOT BE
                                                                        TREATED AS AN ERROR.
                                    37        LOEND
IOMSGR                         -003- 38 #
001 |                                                                                                  | SPLIO | MTCIO |
    |**************************************************************************************************|-------|-------|
    | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

                                    47 STBLKR LAYOUT  2               # FORMAT OF TEMPORARY STORE SPECIFICATION
                                                                        TABLE ENTRY
                                    49        ITEM    ADDR            # BASE ADDRESS OF BLOCK
                                    50 LENGTH ITEM    12              # LENGTH OF BLOCK
                                    51        LOEND
```

```
STBLKR                                  -003- 01 #
00 |                                      LENGTH                                                    |
   |                                  LENGTH OF BLOCK                          |  BASE ADDRESS OF BLOCK  |
01 |                                                                           |                         |
   | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

                                        13 MCHORDER LAYOUT 2                    # FORMAT OF MCH ORDERS AS USED BY SUBROUTINE
                                                                                  EXCMCH
                                        15        ITEM    ADDR                  # 20 BIT CONSTANT TO BE LOADED INTO MCHTR
                                        16        ITEM    8                     # 4-OUT-OF-8 CODE MCH ORDER
                                        17 NOLDTR ITEM    1                     # LEAVE THE MCHTR 0 INCLUDING PARITY
                                        18        LOEND
MCHORDER                                -003- 19 #
00 |                      |NOLDTR |                                              |                         |
   |**********************|       |                4-OUT-OF-8 CODE MCH ORDER     |                         |
01 |                                                                           |                         |
   | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

                    0000003             33 IOWAIT EQU     3                     # NUMBER OF LOOPS TESTIO WILL EXECUTE
                                                                                  WAITING FOR  IO RESPONSE.
0600000                                 35                                      # EACH LOOP IS ABOUT 8.25 MICROSECONDS.

                                        39 # CONSTANT USED BY WPST AND WPOST SUBROUTINES
                    0006061             40 MASCINIT EQU   B(110000110001)       # IO ORDER USED TO INITIALIZE MASC
                    0000361             41 MASCINITH EQU  B(000011110001)       # HARD MASC INITIALIZATION CONSTANT
                    0006060             42 MASCUNBK EQU   B(110000110000)       # IO ORDER TO UNBLOCK THE BUS
0110000                                 43 CSYSUB CSECT
                              -001- 44        *
                              -001- 45        *       COMMON SYSTEM SUBROUTINES (GENERAL PURPOSE)
                              -001- 46        *       ----------------------------------------
                              -001- 47        *
```

```
                                -002- 01        *
                                -002- 02        *       BCD TO BINARY CONVERSION
                                -002- 03        *       ------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * CONVERT A 4-DIGIT BCD NUMBER TO BINARY
                    07  *
                    08  * ENTRY POINTS:
                    09  * BCDXBIN
                    10  *
                    11  * ENTRY CONDITIONS:
                    12  * R0 = BCD NUMBER
                    13  *
                    14  * EXIT CONDITIONS:
                    15  * R0 = BINARY NUMBER
                    16  * R1 NON-ZERO IF R0 CONTAINED A BCD CHARACTER OTHER THAN DIGITS 0 THRU 9




                                    22 # THIS SUBROUTINE USES THE FOLLOWING ALGORITHM TO CONVERT A 4-DIGIT BCD NUMBER
                                    23 # TO BINARY.  IF THE 4 BCD DIGITS ARE LABELED A,B,C, AND D, THE BCD
                                    24 # REPRESENTATION IS EQUIVALENT TO THE BINARY NUMBER 4096A+512B+16C+D.  THE
                                    25 # BINARY VALUE OF THE NUMBER IS, OF COURSE, 1000A+100B+10C+D.  THE ALGORITHM
                                    26 # ESSENTIALLY PERFORMS THIS TRANSFORMATION.  THE ACTUAL CALCULATIONS ARE
                                    27 # ILLUSTRATED BELOW:

                                    29 #  4096A+256B+16C+D
                                    30 # -1536A                    1536=(4096/4)+(4096/8)
                                    31 #--------------------
                                    32 #  2560A+256B+16C+D
                                    33 # - 960A+ 96B                960=(2560/4)+(2560/8)
                                    34 #--------------------         96=(256/4)+(256/8)
                                    35 #  1600A+160B+16C+D
                                    36 # - 600A+ 60B+ 6C            600=(1600/4)+(1600/8)
                                    37 #--------------------         60=(160/4)+(160/8)
                                    38 #  1000A+100B+10C+D           6=(16/4)+(16/8)


0110000                             42 BCDXBIN
0110000                             43         BEGIN
0110000 01 000000 171420 ------ -002- 44         HA
0110001                             45         CALL    TENZERO             # CONVERT BCD 0 FORM FROM 1010 TO 0000
0110001 01 000001 037020 110072 0110072 -001- 46    BSA     TENZERO
0110003 01 000003 106121 ------     47         LR      R5,R1               # SAVE R1
                                    48 R4      =       3-1                 # SET LOOP TO 3 (FOR 3 SUBTRACTIONS LISTED
                                                                             ABOVE)
```

```
0110004 01 000004 003102 ------          -004- 01          LN      R4,3-1
                                               02 R3      =       MSK(4)              # USED TO GENERATE DYNAMIC MASK
0110005 01 000005 003077 ------          -004- 03          LN      R3,MSK(4)
0110006 01 000006 003040 ------                04          ZR      R2                  # USED TO GENERATE DYNAMIC MASK
0110007                                        05 BCDXBINLP
                                               06 R1      =       R0
0110007 01 000007 106020 ------          -004- 07          LR      R1,R0
                                               08 R2      =       R2 | (R3 /RR 4)     # FORM NEXT MASK (EITHER A,AB, OR ABC
0110010 01 000010 010464 ------          -009- 09          RRN     R3,4
0110011 01 000011 014443 ------          -004- 10          OR      R2,R3
                                               11 R1      =       R1 & R2             # ISOLATE SUBTRAHEND
0110012 01 000012 014022 ------          -004- 12          NR      R1,R2
                                               13 R0      =       R0 - (R1 /RR 2) - (R1 /RR 1) # R0=R0-(R1/4)-(R1/8)
0110013 01 000013 010422 ------          -009- 14          RRN     R1,2
0110014 01 000014 005001 ------          -004- 15          SR      R0,R1
0110015 01 000015 010421 ------          -009- 16          RRN     R1,1
0110016 01 000016 005001 ------          -004- 17          SR      R0,R1
0110017 01 000017 036100 110007 0110007        18          BX      R4,BCDXBINLP
0110021 01 000021 006025 ------                19          LR      R1,R5               # RETURN RESULT OF BCD CHARACTER TEST MADE
                                                                                          IN 'TENZERO'
0110022                                        21          RETURN
0110022 01 000022 056420 ------          -001- 22          BTSAG
```

```
                                    -002- 01        *
                                    -002- 02        *       BINARY TO BCD CONVERSION
                                    -002- 03        *       ------------------------
                                    -002- 04        *
                    05  * DESCRIPTION:
                    06  * CONVERT A BINARY NUMBER INTO BCD.
                    07  *
                    08  * ENTRY POINTS:
                    09  * BINXBCD
                    10  *
                    11  * ENTRY CONDITIONS
                    12  * R0 = THE BINARY NUMBER
                    13  *
                    14  * EXIT CONDITIONS
                    15  * R1 = LOW 4 BCD NUMBERS AND R0 = 5TH BCD DIGIT.



                                0000001         21 RESULT EQUR    1
                                0000002         22 CONST  EQUR    2
                                0000003         23 TEMP   EQUR    3
                                0000004         24 INDEX  EQUR    4
                                0000007         25 DIGIT5 EQUR    7
0110023                                         26 BINXBCD
0110023                                         27        BEGIN
0110023 01 000023 171420 ------         -002- 28        HA
0110024 01 000024 003160 ------               29        ZR      DIGIT5
0110025                                       30 CONCON
0110025 01 000025 103400 154360               31        SI      R0,10000
0110027 01 000027 055003 ------ 0110032       32        BNC     SMALLER
0110030 01 000030 004561 ------               33        AN      DIGIT5,1        # ACCUMULATE 10K DIGIT
0110031 01 000031 053774 ------ 0110025       34        B       CONCON
0110032                                       35 SMALLER
0110032 01 000032 103400 023420               36        AI      R0,10000
0110034 01 000034 003441 017500               37        LI      CONST,8000
0110036 01 000036 003020 ------               38        ZR      RESULT
0110037 01 000037 006060 ------               39        LR      TEMP,R0
0110040                                       40 INIT
0110040 01 000040 103501 000003               41        LI      INDEX,3
0110042                                       42 LOOP
0110042 01 000042 105002 ------               43        SR      R0,CONST
0110043 01 000043 055003 ------ 0110046       44        BNC     CONTIN
0110044                                       45                        # THE NUMBER IS STILL POSITIVE
0110044 01 000044 006060 ------               46        LR      TEMP,R0
0110045 01 000045 026424 ------               47        SBR     RESULT,INDEX
0110046                                       48 CONTIN
0110046 01 000046 106003 ------               49        LR      R0,TEMP
```

```
0110047 01 000047 010441 ------                    01        RRN     CONST,1
0110050 01 000050 036100 110042 0110042            02        BX      INDEX,LOOP

0110052 01 000052 024050 ------                    04        TBN     CONST,8       #   WAS THOUSANDS DIGIT JUST COMPLETED?
0110053 01 000053 054010 ------ 0110063            05        BC      DOHUND
0110054 01 000054 024045 ------                    06        TBN     CONST,5       #   WAS HUNDREDS  DIGIT JUST COMPLETED?
0110055 01 000055 054011 ------ 0110066            07        BC      DOTEN

0110056                                            09 UNITS                        # UNITS DIGIT IS REMAINDER IN R0
0110056 01 000056 110434 ------                    10        RLN     RESULT,4
0110057 01 000057 016020 000017                    11        IRM     RESULT,R0,B(1111)
0110061 01 000061 006007 ------                    12        LR      R0,DIGIT5
0110062                                            13        RETURN
0110062 01 000062 056420 ------          -001-     14        BTSAG

0110063                                            16 DOHUND                       #   DO HUNDREDS DIGIT
0110063 01 000063 103441 001440                    17        LI      CONST,800
0110065 01 000065 053003 ------ 0110070            18        B       DOROTAT
0110066                                            19 DOTEN                        #   DO TENS DIGIT
0110066 01 000066 103441 000120                    20        LI      CONST,80
0110070                                            21 DOROTAT
0110070 01 000070 110434 ------                    22        RLN     RESULT,4
0110071 01 000071 053747 ------ 0110040            23        B       INIT
```

```
                                -002- 01        *
                                -002- 02        *       CONVERT BCD ZERO
                                -002- 03        *       ----------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * EXAMINE EACH DIGIT OF A 4-DIGIT BCD NUMBER FOR ONE OF TWO
                    07  * ZERO FORMS (1010 OR 0000) AND CONVERT TO THE OTHER FORM.
                    08  *
                    09  * THE ASSUMPTION IS ALSO MADE THAT ONLY DIGITS 0 THRU 9 ARE VALID.
                    10  * THEREFORE, A CHECK IS MADE FOR CHARACTERS PLUS(+),MINUS(-), SPACE,PERIOD
                    11  * AND RUBOUT. IF R1 IS RETURNED NON-ZERO, THEN ONE OF THESE CHARACTERS
                    12  * WAS PRESENT AS ONE OF THE 4 BCD CHARACTERS IN R0.
                    13  * ENTRY POINTS:
                    14  * TENZERO--CONVERT 1010 FORM TO 0000 FORM
                    15  * ZEROTEN--CONVERT 0000 FORM TO 1010 FORM
                    16  *
                    17  * ENTRY CONDITIONS:
                    18  * R0 = 4-DIGIT BCD NUMBER
                    19  *
                    20  * EXIT CONDITIONS:
                    21  * R1 = 0 ONLY IF R0 CONTAINED THE DIGITS 0 THRU 9



0110072                                     27 TENZERO
                                            28 R1      =        E(10)
0110072 01 000072 103421 002000     -004-   29                 LI      R1,E(10)
0110074 01 000074 053002 ------ 0110076     30                 B       ZTMERGE


0110075                                     34 ZEROTEN
                                            35 R1      =        E(0)
0110075 01 000075 103021 ------     -004-   36                 LN      R1,E(0)


0110076                                     40 ZTMERGE
0110076                                     41         BEGIN
0110076 01 000076 171420 ------     -002-   42                 HA
                                            43 R2      =        3                   # LOOP 4 TIMES FOR 4 BCD DIGITS
0110077 01 000077 003043 ------     -004-   44                 LN      R2,3
                                            45 R3      =        0                   # INITIALIZE R3
0110100 01 000100 003060 ------     -004-   46                 ZR      R3
0110101                                     47 ZEROTENLP
0110101 01 000101 110404 ------             48                 RRN     R0,4        # SETUP NEXT DIGIT
0110102 01 000102 026460 ------             49                 SBR     R3,R0       # SET BIT EQUAL TO THE CHARACTER
```

```
0110103 01 000103 024420 ------                  01        TBR     R1,R0
0110104                                          02        IF      CF = 1 THEN XI R0,10
0110104 01 000104 055003 ------ 0110107  -001-  03            BNC     IFS149
0110105 01 000105 003404 000012          -001-  04            XI      R0,10          #
0110107                                  -001-  05 IFS149
0110107 01 000107 136040 110101 0110101          06        BX      R2,ZEROTENLP
0110111 01 000111 003462 174000                  07        NI      R3,MSK(5,11)       # SAVE BITS FOR OTHER THAN 0 THRU 9
0110113 01 000113 006023 ------                  08        LR      R1,R3              # RETURN RESULTS IN R1
0110114                                          09        RETURN
0110114 01 000114 056420 ------          -001-   10        BTSAG
```

```
                                    -002- 01        *
                                    -002- 02        *       16 OR 20 BIT ADDS AND SUBTRACTS
                                    -002- 03        *       ------------------------------
                                    -002- 04        *
                    05 # DESCRIPTION
                    06 # Performs double register (20-bit) addition.  Adds either a 16 or 20 bit
                    07 # in R0,R1 to RA1.
0110115             08
                    09 # ENTRIES
                    10 # ADD16
                    11 # ADD20
0110115             12
                    13 # INPUTS
                    14 # RA1 = 20-BIT AUGEND
                    15 # R1 = LOW 16 BITS OF ADDEND
                    16 # R0(3-0) = HIGH 4 BITS OF ADDEND (ADD20 ONLY)
0110115             17
                    18 # OUTPUTS
                    19 # RA1 = 20-BIT SUM
                    20 # R0 = 0 IF NO OVERFLOW
                    21 # R0 ¬= 0 IF OVERFLOW (RESULT > E(20))

0110115                                         23 ADD16
0110115                                         24          BEGIN   ()
0110115 01 000115 103000 ------                 25          ZR      R0

0110116                                         27 ADD20
0110116                                         28          BEGIN
0110116 01 000116 171420 ------         -002-   29          HA
0110117 01 000117 003402 000D17                 30          NI      R0,MSK(4)
0110121 01 000121 003742 000D17                 31          NI      RA1,MSK(4)
0110123 01 000123 003040 ------                 32          ZR      R2
0110124 01 000124 001761 ------                 33          AR      RA1+1,R1
0110125 01 000125 030040 ------                 34          ICF     R2,0                    # SAVE CARRY
0110126 01 000126 001740 ------                 35          AR      RA1,R0
0110127 01 000127 001742 ------                 36          AR      RA1,R2                  # ADD CARRY
0110130 01 000130 072756 ------                 37          HN      RA1,14
0110131 01 000131 072777 ------                 38          HN      RA1+1,15
0110132 01 000132 016416 177760                 39          LRM     R0,RA1,MSK(12,4)        # TRANSFER OVERFLOW INFO TO R0
0110134                                         40          RETURN
0110134 01 000134 056420 ------         -001-   41          BTSAG
```

```
                    01 # DESCRIPTION
                    02 # Performs double register (20-bit) subtraction.  Subtracts either a 16
                    03 # or 20 bit quantity in R0,R1 from RA1.
0110135             04
                    05 # ENTRIES
                    06 # SUB16
                    07 # SUB20
0110135             08
                    09 # INPUTS
                    10 # RA1 = 20-BIT MINUEND
                    11 # R1 = LOW 16 BITS OF SUBTRAHEND
                    12 # R0(3-0) = HIGH 4 BITS OF SUBTRAHEND
0110135             13
                    14 # OUTPUTS
                    15 # RA1 = 20-BIT DIFFERENCE
                    16 # R0 = 0 IF DIFFERENCE IS POSITIVE
                    17 # R0 -= 0 IF DIFFERENCE IS NEGATIVE

0110135                                          19 SUB16
0110135                                          20        BEGIN   ()
0110135 01 000135 103000 ------                  21        ZR      R0                  # ZERO HI BITS

0110136                                          23 SUB20
0110136                                          24        BEGIN
0110136 01 000136 171420 ------          -002-   25        HA
0110137 01 000137 003402 000017                  26        NI      R0,MSK(4)           # KEEP ONLY HIGH 4 OF 20 BIT NO.
0110141 01 000141 003742 000017                  27        NI      RA1,MSK(4)
0110143 01 000143 005361 ------                  28        SR      RA1+1,R1            # SUB LOW 16 BITS
0110144 01 000144 054002 ------ 0110146          29        BC      NODEC               # B IF SUBTRAHEND LESS THAN OR EQUAL
0110145 01 000145 004357 ------                  30        SN      RA1,1               # DECREMENT HI 4 BITS OF MINUEND
0110146                                          31 NODEC
0110146 01 000146 105340 ------                  32        SR      RA1,R0              # SUB HI 4 BITS
0110147 01 000147 072756 ------                  33        HN      RA1,14              # STORE OF RESULT FOR RETURN 'GA'
0110150 01 000150 072777 ------                  34        HN      RA1+1,15
0110151 01 000151 016416 177760                  35        LRM     R0,RA1,MSK(12,4)    # TRANSFER POS/NEG INFO TO R0
0110153                                          36        RETURN
0110153 01 000153 056420 ------          -001-   37        BTSAG
```

```
                                    -002- 01        *
                                    -002- 02        *       20 BIT COMPARE
                                    -002- 03        *       --------------
                                    -002- 04        *
                    05 # DESCRIPTION
                    06 # Performs a double register (20-bit) arithmetic comparison.  Compares
                    07 # R..0 TO RA1.
0110154             08
                    09 # ENTRIES
                    10 # CMPR20
0110154             11
                    12 # INPUTS
                    13 # RA1 = 20-BIT QUANTITY
                    14 # RA0 = 20-BIT QUANTITY
0110154             15
                    16 # OUTPUTS
                    17 # R0 = RETURN CODE
                    18 #      2 - RA1 > RA0
                    19 #      1 - RA1 = RA0
                    20 #      0 - RA1 < RA0
                    21 # CF = 0 IF RA1 >= RA0
                    22 # CF = 1 IF RA1 < RA0

0110154                                         24 CMPR20
0110154                                         25      BEGIN
0110154 01 000154 171420 ------         -002- 26      HA
0110155 01 000155 003702 000017               27      NI      RA0,MSK(4)
0110157 01 000157 003742 000017               28      NI      RA1,MSK(4)
0110161                                       29      IF      R14 > R12 THEN RETURN 2
0110161 01 000161 006014 ------         -003- 30          LR      R0,R12
0110162 01 000162 005016 ------         -003- 31          SR      R0,R14
0110163 01 000163 054002 ------ 0110165 -001- 32          BC      IFS180
0110164 01 000164 056442 ------         -002- 33          BTSAGN  2
0110165                                 -001- 34 IFS180
0110165                                       35      IF      R1. < R12 THEN RETURN 0
0110165 01 000165 106016 ------         -003- 36          LR      R0,R14
0110166 01 000166 005014 ------         -003- 37          SR      R0,R12
0110167 01 000167 054002 ------ 0110171 -001- 38          BC      IFS184
0110170 01 000170 056440 ------         -002- 39          BTSAGN  0
0110171                                 -001- 40 IFS184
0110171                                       41      IF      R15 > R13 THEN RETURN 2
0110171 01 000171 106015 ------         -003- 42          LR      R0,R13
0110172 01 000172 005017 ------         -003- 43          SR      R0,R15
0110173 01 000173 054002 ------ 0110175 -001- 44          BC      IFS188
0110174 01 000174 056442 ------         -002- 45          BTSAGN  2
0110175                                 -001- 46 IFS188
0110175                                       47      IF      R15 < R13 THEN RETURN 0
0110175 01 000175 106017 ------         -003- 48          LR      R0,R15
0110176 01 000176 005015 ------         -003- 49          SR      R0,R13
```

```
0110177 01 000177 054002 ------ 0110201  -001- 01          BC      IFS192
0110200 01 000200 056440 ------          -002- 02          BTSAGN  0
0110201                                  -001- 03 IFS192
0110201                                        04          RETURN  1
0110201 01 000201 156441 ------          -001- 05          BTSAGN  1
```

```
                                -D02- 01        *
                                -D02- 02        *       INTERRUPT BEGIN AND END ROUTINES
                                -D02- 03        *       ------------------------------
                                -D02- 04        *
05  * DESCRIPTION:
06  * INTBEGIN IS A SPECIAL SUBROUTINE CALLED ONLY BY AN
07  * INTERRUPT PROGRAM.  IT REQUIRES A SPECIAL CALLING SEQUENCE.
08  * ALL OF THE BOOKWORK REQUIRED TO GET INTO AND OUT OF AN
09  * INTERRUPT IS PERFORMED.
10  *
11  * ENTRY POINTS:
12  * INTBEGIN
13  * INTBGNX--SAME AS INTBEGIN BUT FOR INTERRUPTS FROM EXTERNAL DEVICES
14  * INTEND
15  *
16  * ENTRY CONDITIONS:
17  * THE FOLLOWING RIGID SEQUENCE MUST BE OBSERVED AND MUST APPEAR
18  * AT THE ENTRY TO AN INTERRUPT PROGRAM:
19  *
20  * INTENTRY
21  *           HA
22  *           LI   R2,E(INTERRUPT NUMBER,0-15)
23  *           CALL INTBEGIN
24  * INTSTART
25  *
26  *       (ENTIRE INTERRUPT PROGRAM)
27  *
28  * BL INTEND
29  *
30  * EXIT CONDITIONS:
31  * THE FIRST EXIT IS TO THE RETURN ADDRESS,IE, LOCATION INTSTART
32  * ABOVE.  R0,R1,CF, AND IM HAVE BEEN SAVED,  IM HAS BEEN SET TO
33  * NEW PRIORITY CONSTANT.  IS BIT AND BIN HAVE BEEN RESET.
34  * NONE OF THE GENERAL REGISTERS ARE PRESERVED.
35  *
36  * THIS ROUTINE DOES NOT RETURN AFTER REENTRY AT INTEND.
37  * AT THAT ENTRY POINT, THE STATE OF THE CC IS RESTORED
38  * AND THE PIE TO END THE INTERRUPT IS GIVEN.

0110202                                 41      CFSAVR_PICTURE
CFSAVR                          -D01- 42 #
001 |*****************************************************************************************************| CFSAV |
    |  15 |  14 |  13 |  12 |  11 |  10 |  9 |  8 |  7 |  6 |  5 |  4 |  3 |  2 |  1 |  0 |
```

```
0110202                                          01 INTBGNX
0110202                                          02       BEGIN   ()
                                                 03 # THE CF MUST BE SAVED BEFORE ANY INSTRUCTION WHICH CHANGES IT IS EXECUTED
0110202 01 000202 130100 ------                  04       ICF     R4,S(CFSAV)
                                                 05 # ONLY A LIMITED NUMBER OF EXTERNAL INTERRUPTS ARE ALLOWED EACH
                                                 06 # BASE LEVEL LOOP. IT IS ASSUMED THAT A FAULT HAS OCCURRED
                                                 07 # IF THIS THRESHOLD IS EVER EXCEEDED. IN PARTICULAR, AN EXCESSIVE
                                                 08 # NUMBER OF CALLS TO INTBGNX CAN RESULT FROM A SINGLE STUCK INTERRUPT.
                                                 09 # ONLY EXTERNAL INTERRUPTS ARE OF CONCERN BECAUSE THEY AFFECT BOTH CC'S.
                                                 10 # THE RECOVERY MECHANISM FOR STUCK INTERNAL INTERRUPTS IS A SWITCH
                                                 11 # TO THE OTHER CC. THIS IS ACCOMPLISHED BY THE PROGRAM TIMER
                                                 12 # TIMING OUT.
0110203 01 000203 037040 043142 CTSD               13       A1S     INTCNT                  # INCREMENT THE PER BASE LEVEL LOOP COUNT OF
                                                                                               EXTERNAL INTERRUPTS
0110205 01 000205 054030 ------ 0110235          15       BC      STUCKINT                # ASSUME A STUCK INTERRUPT ON OVERFLOW AND GO
                                                                                               TO BLOCK IT
0110206 01 000206 024100 ------                  17       TBN     R4,S(CFSAV)             # RESTORE THE CF FOR INTBEGIN


0110207                                          21 INTBEGIN
0110207                                          22       ABEGIN
                                                 23 # THE CF MUST BE SAVED BEFORE ANY INSTRUCTION WHICH CHANGES IT IS EXECUTED
0110207 01 000207 130100 ------                  24       ICF     R4,S(CFSAV)
0110210 01 000210 031460 043143 CTSD             25       LAL     R3,INTRCORD,RA1         # RECORD THAT THIS INTERRUPT OCCURRED
0110212 01 000212 014462 ------                  26       OR      R3,R2
0110213 01 000213 044460 ------                  27       ST      R3,0(RA1)
0110214                                          28       GRTNADR RA1                     # GET ADDRESS NOW IN ORDER TO REUSE SLOTS 0
                                                                                               AND 1
0110214 01 000214 072340 ------          -001-   30       GN      RA1,0
0110215 01 000215 072361 ------          -001-   31       GN      RA1+1,1
                                                 32 # THE UTILITY REGISTER DUMP ROUTINE ASSUMES R0 AND R1 ARE
                                                 33 # IN SLOTS 0 AND 1, RESPECTIVELY
0110216 01 000216 072400 ------                  34       HN      R0,0                    # HOLD REGISTERS NOT HELD BY HA INSTRUCTION
0110217 01 000217 072421 ------                  35       HN      R1,1
E0110220 01 000220 021074 ------                 36       LRS     R3,IM
0110221 01 000221 072462 ------                  37       HN      R3,2                    # SAVE THE IM BECAUSE IT IS ABOUT TO BE
                                                                                               CHANGED
0110222 01 000222 072503 ------                  39       HN      R4,3                    # SAVE CF
0110223 01 000223 015502 ------                  40       COM     R4,R2                   # FORM NEW IM TO BLOCK ALL LOWER INTERRUPTS
0110224 01 000224 004501 ------                  41       AN      R4,1
0110225 01 000225 014464 ------                  42       OR      R3,R4
0110226 01 000226 022075 ------                  43       ZBN     R3,S(MANI)              # GUARANTEE USE OF PANEL
0110227 01 000227 007703 ------                  44       LSR     IM,R3
0110230                                          45       MIMODE  L IS_R,R2               # RESET INTERRUPT SOURCE
0110230 01 000230 013000 ------          -001-   46       MIS     0
0110231 01 000231 033126 ------          -002-   47            VFD     8,IS_RXT 8,R2XF
0110232                                          48       ZBIN
0110232 01 000232 013002 ------          -001-   49       MIS     2
```

```
0110233 01 000233 107322 ------          -001- 01        DATA    36562
                                             02 # RA1 LOADED FROM TIME CF WAS SAVED
0110234 01 000234 052420 ------              03        BR      0(RA1)              # RETURN TO INTERRUPT PROGRAM BUT REMAIN AT
                                                                                   THIS HG LEVEL



0110235                                      10 STUCKINT
                                             11 # BLOCK THIS INTERRUPT BECAUSE IT IS STUCK
                                             12 CSYSUB OW      0(235)              # 13874
                                        -001- 13        NOTE    ************** THE FIRST ADDRESS OVERWRITTEN IS 000235 **********


                                             16 CPATCH3 BGNP   0(154)              # 13874
0110235 01 000235 137000 115247 0115247 -001- 17        BL      XXX213
                                        -001- 18        NOTE    CPATCH3 'CSECT'
                                        -001- 19        NOTE    ****************** PATCH AREA BEGINS AT 000154 *****************


0115247                                 -001- 22 XXX213 PATCHAREA
0115247 05 000154 172400 ------              23        HN      R0,0                # SAVE R0 AND R1
0115250 05 000155 072421 ------              24        HN      R1,1
0115251 05 000156 031460 043021 CTSD         25        LAL     R3,IM_IMAGE,RA1     # RECORD THAT THE INTERRUPT OCCURED
0115253                                      26        ENDP                        # 13874
0115253 05 000160 037000 110237 0110237 -001- 27        BL      XXX215
                                        -001- 28        NOTE    ************ LAST PATCH ADDRESS USED IS 000161 ***************
                                        -001- 29        NOTE    ***** NUMBER OF PATCH WORDS USED IS 6 (DECIMAL) ********


0110237                                 -001- 32 XXX215 OWCONTINUE
0110237 01 000237 114462 ------              33        OR      R3,R2               # BLOCK THE INTERRUPT
0110240                                      34        EOW                         # 13874
                                        -001- 35        NOTE    *************** THE LAST ADDRESS OVERWRITTEN IS 000237 *********
                                                                 *


0110240 01 000240 044460 ------              39        ST      R3,0(RA1)
0110241 01 000241 007703 ------              40        LSR     IM,R3
0110242 01 000242 015442 ------              41        COM     R2
0110243 01 000243 020446 ------              42        FLZ     R2,R6
0110244                                      43        PRINT   FMT=(WRD(R,M,V),WRD(I,N,T),DEC),PACTION=*,PRIOR=2

                                        -001- 45 #  MESSAGE PROTOTYPE
                                        -001- 46 #    * mm      RMV INT ddddd
0110244 01 000244 073053 ------         -002- 47        BSAI    PXMRY               # SUBROUTINE PMRY IS IN PROGRAM TTYAPP
0110245 01 000245 103240 ------         -002- 48        VFD     1,1 2,0 1,0 3,3 1,0 1,1 1,1 1,0 2,2 1,0 3,0
0110246 01 000246 021044 ------         -002- 49        VFD     4,TTYO_ 4,TTYO_ 4,TTYO_ 4,TTYO_DEC
```

```
0110247 01 000247 021042 ------          -002- 01        VFD     4,TTYO_ 4,TTYO_ 4,TTYO_ 4,TTYO_
0110250 01 000250 010035 ------ TTYTBL   -002- 02        VFD     5,2 11,RXMV
0110251 01 000251 001113 ------ TTYTBL   -002- 03        VFD     5, 11,IXNT
                                         -001- 04        NOTE    THE VARIABLE PORTION OF THE OUTPUT MESSAGE TO BE PRINTED IS
                                                                   CONTAINED IN GENERAL REGISTERS R6,
                                         -001- 06        NOTE    ****THIS MESSAGE WILL RESULT IN A MINOR ALARM****
                                               07 CSYSUB OW      0(252)                  # 13874
                                         -001- 08        NOTE    ************** THE FIRST ADDRESS OVERWRITTEN IS 000252 **********

0110252 01 000252 153006 ------ 0110260       11        B       INTRST
0110253                                      12        EOW                             # 13874
                                         -001- 13        NOTE    ***************** THE LAST ADDRESS OVERWRITTEN IS 000252 *********
                                                                  *

0110253                                      27 INTEND
0110253                                      28        MIMODE  DATA=S(BIN),L SS_S,YT
0110253 01 000253 113002 ------          -001- 29        MIS     S(BIN)
0110254 01 000254 105722 ------          -002- 30            VFD     8,SS_SXT 8,YTXF
0110255 01 000255 072062 ------              31        GN      R3,2                    # GET SAVED IM
0110256 01 000256 007703 ------              32        LSR     IM,R3
                                             33 CSYSUB OW      0(257)                  # 13874
                                         -001- 34        NOTE    ************** THE FIRST ADDRESS OVERWRITTEN IS 000257 **********

0110257 01 000257 072103 ------              37        GN      R4,3                    # GET SAVED CF AND IO FLAGS
0110260                                      38 INTRST
0110260 01 000260 172000 ------              39        GN      R0,0                    # RESTORE R0 AND R1
0110261 01 000261 072021 ------              40        GN      R1,1
0110262                                      41        EOW                             # 13874
                                         -001- 42        NOTE    ***************** THE LAST ADDRESS OVERWRITTEN IS 000261 *********
                                                                  *
```

```
                                                01 DDELETE NOTE   1
0110262                                         02         MIMODE  L R2,HG              # INCREMENT HG, IE GO TO ORIGINAL LEVEL
0110262 01 000262 113000 ------          -001- 03         MIS     0
0110263 01 000263 053065 ------          -002- 04             VFD     8,R2%T 8,HG%F
0110264 01 000264 003440 000020                05         AI      R2,16
0110266                                         06         MIMODE  L HG,R2
0110266 01 000266 013000 ------          -001- 07         MIS     0
0110267 01 000267 032526 ------          -002- 08             VFD     8,HG%T 8,R2%F
0110270 01 000270 024100 ------                09         TBN     R4,S(CFSAV)          # RESTORE THE CF
0110271 01 000271 071400 ------                10         GA                           # RESTORE R2-R15
0110272                                         11 PIERTN
0110272 01 000272 156500 ------                12         PIE                          # RETURN FROM INTERRUPT
```

```
                                -002- 01        *
                                -002- 02        *       UNLOAD AND LOAD IO CHANNEL STATE
                                -002- 03        *       -------------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * THESE TWO COMPLEMENTARY SUBROUTINES ARE USED TO UNLOAD OR
                    07  * LOAD THE TWO STATE REGISTERS IN AN IO CHANNEL (IOD AND CHC).
                    08  * THE IOD IS TREATED NORMALLY. HOWEVER, BECAUSE OF HARDWARE
                    09  * RESTRICTIONS, THE CHC CANNOT ALWAYS BE RESTORED TO THE STATE
                    10  * IN WHICH IT WAS FOUND. HENCE, THE FOLLOWING MECHANISM IS USED.
                    11  * THE UNLOAD SUBROUTINE DOES NOT UNLOAD THE CHC BUT DIFFERENTIATES BETWEEN
                    12  * FOUR STATES: IDLE, NORMAL COMPLETE, MAINTENANCE COMPLETE, AND ANYTHING
                    13  * ELSE WHICH IS CONSIDERED AN ERROR. THEN, THE LOAD SUBROUTINE
                    14  * TAKES THE APPROPRIATE ACTION FOR EACH OF THE STATES.
                    15  * THESE SUBROUTINES ARE NORMALLY USE TO SAVE AND RESTORE A CHANNEL IN
                    16  * AN INTERRUPT.
                    17  *
                    18  * ENTRY POINT:
                    19  * UNLODIOC
                    20  *
                    21  * ENTRY CONDITIONS:
                    22  * R9 = IO CHANNEL 3X6 ADDRESS
                    23  *
                    24  * EXIT CONDITIONS:
                    25  * R0 = CODE INDICATING CHC STATE
                    26  *      0--CHANNEL WAS IDLE
                    27  *      1--NORMAL COMPLETE
                    28  *      2--MAINTENANCE COMPLETE
                    29  *      3--ERROR
                    30  * R1 = CONTENTS OF IOD (1 AND 2 ONLY)


0110273                                         34 UNLODIOC
                                                35 # DELAY THE HA TO MAKE IDLE CASE FAST
0110273                                         36         BEGIN   ()
0110273 01 000273 123540 ------                 37         TCH
0110274                                         38         IF      CF THEN RETURN 0
0110274 01 000274 055002 ------ 0110276 -002-   39             BNC     IFS252
0110275 01 000275 056460 ------         -003-   40             BTSAN   0
0110276                                 -002-   41 IFS252
0110276                                         42         BEGIN
0110276 01 000276 171420 ------         -002-   43         HA
0110277 01 000277 023500 ------                 44         TIO
0110300 01 000300 006033 ------                 45         LR      R1,R11
0110301                                         46         IF      CF THEN RETURN 1
0110301 01 000301 055002 ------ 0110303 -002-   47             BNC     IFS258
0110302 01 000302 056441 ------         -003-   48             BTSAGN  1
0110303                                 -002-   49 IFS258
```

```
0110303 01 000303 123520 ------                  01        TMIO
0110304 01 000304 006033 ------                  02        LR      R1,R11
0110305                                          03        IF      CF THEN RETURN 2
0110305 01 000305 055002 ------ 0110307 -002-    04            BNC     IFS261
0110306 01 000306 056442 ------         -003-    05            BTSAGN  2
0110307                                 -002-    06 IFS261
0110307 01 000307 123560 ------                  07        ZIO                          # IDLE I/O CHANNEL ON ERROR RETURN
0110310                                          08        RETURN  3
0110310 01 000310 056443 ------         -001-    09        BTSAGN  3




                                                 15        *       ENTRY POINT:
                                                 16        *       LODIOC
                                                 17        *
                                                 18        *       ENTRY CONDITIONS:
                                                 19        *       R9 = IO CHANNEL 3X6 ADDRESS
                                                 20        *       R0,R1-SEE EXIT CONDITIONS FOR UNLODIOC
                                                 21        *
                                                 22        *       EXIT CONDITIONS:
                                                 23        *       IF R0 = 3 (IE, AN ERROR) THE CHANNEL HAS BEEN LEFT IDLE
                                                 24        *       IF R0 = 0,1,2 THE IOD IS RESTORED AND THE CHC IS SET TO
                                                 25        *       IDLE, NORMAL COMPLETE, MAINTENANCE COMPLETE RESPECTIVELY.


0110311                                          29 LODIOC
                                                 30 # DELAY THE HA TO MAKE IDLE CASE FAST
0110311                                          31        BEGIN   ()
0110311 01 000311 123560 ------                  32        ZIO                          # PRECAUTIONARY MEASURE
0110312 01 000312 003402 000003                  33        NI      R0,MSK(2)            # PROTECT AGAINST BAD DATA IN R0
0110314 01 000314 056000 ------                  34        BPAX    R0
0110315                                          35        RETURN  0
0110315 01 000315 156460 ------         -001-    36        BTSAN   0
0110316 01 000316 153003 ------ 0110321          37        B       IONORM
0110317 01 000317 153007 ------ 0110326          38        B       IOMTC
0110320                                          39        RETURN  0
0110320 01 000320 156460 ------         -001-    40        BTSAN   0

0110321                                          42 IONORM
0110321                                          43        SBIN
0110321 01 000321 113002 ------         -001-    44        MIS     2
0110322 01 000322 105722 ------         -001-    45        DATA    35794
0110323                                          46        MIMODE  MD1CHTN               # LOAD IOS WITH NORMAL COMPLETE
0110323 01 000323 013000 ------         -001-    47        MIS     0
0110324 01 000324 164071 ------         -002-    48              DATA    MD1CHTN%
0110325 01 000325 053005 ------ 0110332          49        B       IOLODMG
```

```
0110326 '                                   02 IOMTC
0110326                                     03       SBIN
0110326 01 000326 113002 ------      -001- 04       MIS     2
0110327 01 000327 105722 ------      -001- 05       DATA    35794
0110330                                     06       MIMODE  MD2CHTM          # LOAD IOS WITH MAINTENANCE COMPLETE
0110330 01 000330 013000 ------      -001- 07       MIS     0
0110331 01 000331 164072 ------      -002- 08           DATA    MD2CHTM%
0110332                                     09 IOLODMG

0110332                                     11       BEGIN
0110332 01 000332 171420 ------      -002- 12       HA
0110333 01 000333 003006 ------            13       LN      R0,B(0110)       # 2X4 CODE NEEDED BY MD3CHC CROSSPOINT
0110334 01 000334 016220 000017            14       IRM     R9,R0,MSK(4)
0110336 01 000336 006241 ------            15       LR      R10,R1
0110337                                     16       MIMODE  MD6RAIO          # LOAD IOD
0110337 01 000337 013000 ------      -001- 17       MIS     0
0110340 01 000340 074072 ------      -002- 18           DATA    MD6RAIO%
0110341                                     19       MIMODE  MD3CHC           # LOAD CHC
0110341 01 000341 013000 ------      -001- 20       MIS     0
0110342 01 000342 164074 ------      -002- 21           DATA    MD3CHC%
0110343                                     22       ZBIN
0110343 01 000343 013002 ------      -001- 23       MIS     2
0110344 01 000344 107322 ------      -001- 24       DATA    36562
0110345                                     25       RETURN  0
0110345 01 000345 056440 ------      -001- 26       BTSAGN  0
```

```
                                    -002- 01          *
                                    -002- 02          *       RANGE CHECK ADDRESS
                                    -002- 03          *       -------------------
                                    -002- 04          *
                                          05 # DESCRIPTION:
                                          06 # CHECK A STORE ADDRESS TO DETERMINE IF IT IS IN
                                          07 # AN EQUIPPED STORE MODULE AND WHETHER IT IS WRITE PROTECTED
                                          08 # OR NOT.
0110346                                   09
                                          10 # ENTRY POINT:
                                          11 # RGCHKADR  -  ONLY 20 BITS ARE ASSUMED TO BE IN RA1
0110346                                   12
                                          13 # RGCHK32   -  ALL 32 BITS OF RA1 ARE CHECKED AGAINST 'STRLIM'.
0110346                                   14
0110346                                   15
                                          16 # ENTRY CONDITIONS:
                                          17 # RA1=ADDRESS TO BE CHECKED
0110346                                   18
                                          19 # EXIT CONDITIONS:
                                          20 # R0=RETURN CODE
                                          21 #     0--OUT OF RANGE
                                          22 #     1--PROTECTED STORE BLOCK
                                          23 #     2--UNPROTECTED STORE BLOCK
                                          24 # R1 = WRITE-PROTECT WORD CORRESPONDING TO 64K BLOCK

0110346                                   26 RGCHK32
0110346                                   27         BEGIN
0110346 01 000346 171420 ------  -002-  28         HA
0110347 01 000347 003000 ------           29         ZR      R0                    # FLAG FOR THIS ENTRY
0110350 01 000350 053003 ------ 0110353   30         B       GTSTRLIM

0110351                                   32 RGCHKADR
0110351                                   33         BEGIN
0110351 01 000351 171420 ------  -002-  34         HA
0110352 01 000352 026000 ------           35         SBN     R0,0                  # INSURE R0 NON-ZERO
0110353                                   36 GTSTRLIM
0110353 01 000353 131042 021637 TDATA     37         LAL     R2,STRLIM,RA0
0110355 01 000355 040061 ------           38         L       R3,1(RA0)
0110356 01 000356 003442 000017           39         NI      R2,MSK(4)             # CLR HI BITS OF SRTLIM
0110360 01 000360 014000 ------           40         TZ      R0
0110361 01 000361 054005 ------ 0110366   41         BC      REGSUB                # B IF RGCHK32 ENTRY
0110362 01 000362 003743 177760           42         OI      R14,MSK(12,4)         # INSURE UPPER BITS ARE EQUAL AND NON-ZERO
0110364 01 000364 003443 177760           43         OI      R2,MSK(12,4)          # NON-ZERO BECAUSE COMPARISON MAY BE WRONG
                                                                                   #   WITH ZERO OPERAND
0110366                                   45 REGSUB
0110366 01 000366 105077 ------           46         SR      R3,R15                # 20-BIT SUBTRACT
0110367                                   47         IF      ¬ CF THEN SN R2,1
0110367 01 000367 054002 ------ 0110371  -002- 48           BC      IFS294
0110370 01 000370 004057 ------          -002- 49           SN      R2,1          #
```

```
RANGE CHECK ADDRESS                                                    0:40:27   2/06/81  ****

                                                                                CSYSUB          W77D

0110371                                          -002- 01 IFS294
0110371 01 000371 105056 ------                        02         SR      R2,R14
0110372                                                03         IF      ¬ CF THEN RETURN 0  # ADDRESS IS TOO BIG
0110372 01 000372 054002 ------ 0110374          -002- 04             BC      IFS296
0110373 01 000373 056440 ------                  -003- 05             BTSAGN  0
0110374                                          -002- 06 IFS296
0110374 01 000374 131022 020013 TDATA                  07         LAL     R1,WPTBL,RA0
0110376 01 000376 003742 000017                        08         NI      R14,MSK(4)          # ISOLATE HIGH BITS OF ADDRESS
0110400 01 000400 042036 ------                        09         LX      R1,R14(RA0)         # GET WRITE-PROTECT BITS FOR 65,536 WORD
                                                                                                 BLOCK
0110401 01 000401 010774 ------                        11         RRN     R15,12              # RIGHT ADJUST 4096 WORD BLOCK
0110402 01 000402 024437 ------                        12         TBR     R1,R15
0110403                                                13         IF      CF THEN RETURN 1
0110403 01 000403 055002 ------ 0110405          -002- 14             BNC     IFS299
0110404 01 000404 056441 ------                  -003- 15             BTSAGN  1
0110405                                          -002- 16 IFS299
0110405                                                17         RETURN  2
0110405 01 000405 156442 ------                  -001- 18         BTSAGN  2
```

```
                                -002- 01        *
                                -002- 02        *       TURN OFF WRITE PROTECT OF STORE
                                -002- 03        *       -------------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * DEFEAT THE WRITE PROTECTION MECHANISM FOR ONE
                    07  * 4096-WORD BLOCK OF MAIN STORE.
                    08  *
                    09  * ENTRY POINTS:
                    10  * UNWPST---FOR THIS STORE
                    11  * UNWPOST--FOR OTHER STORE
                    12  *
                    13  * ENTRY CONDITIONS:
                    14  * RA1 = ADDRESS WITHIN THE 4K BLOCK
                    15  *
                    16  * EXIT CONDITIONS:
                    17  * R0 = RETURN CODE
                    18  *      0--SUCCESS
                    19  *      1--ERROR, ADDRESS SPECIFIES AN UNEQUIPPED OR UNPROTECTED 4K BLOCK
                    20  *      2--ERROR, AN OTHER MAS ERROR OCCURRED (UNWPOST ONLY)
                    21  * R1 = CONSTANT NEEDED TO SET UP WRITE PROTECT AGAIN
                    22  * RA0 = ADDRESS NEEDED TO SET UP WRITE PROTECT AGAIN
                    23  *   IE, THE SEQUENCE LR R0,R1/ MST 0(RA0) WILL WRITE PROTECT
                    24  *   THE 4K BLOCK THIS SUBROUTINE UNPROTECTS
                    25  * INTERRUPTS ARE BLOCKED ON EXIT (UNWPST ONLY)


0110406                                         29 UNWPOST
0110406                                         30          BEGIN
0110406 01 000406 171420 ------          -002-  31          HA
0110407 01 000407 026040 ------                32          SBN     R2,0
0110410 01 000410 053003 ------ 0110413        33          B       UNWPMERGE

0110411                                         35 UNWPST
0110411                                         36          ABEGIN
0110411 01 000411 171420 ------          -001-  37          HA
0110412 01 000412 022040 ------                38          ZBN     R2,0            # REMEMBER WHICH ENTRY POINT
0110413                                         39 UNWPMERGE
0110413                                         40          CALL    RGCHKADR
0110413 01 000413 173036 ------          -001-  41          BSAI    rgchkAdr        # SUBROUTINE RGCHKADR IS IN PROGRAM CSYSUB
0110414 01 000414 156000 ------                42          BPAX    R0
0110415                                         43          RETURN  1
0110415 01 000415 156441 ------          -001-  44          BTSAGN  1
0110416 01 000416 153002 ------ 0110420        45          B       DOWP
0110417                                         46          RETURN  1
0110417 01 000417 156441 ------          -001-  47          BTSAGN  1
```

```
   TURN OFF WRITE PROTECT OF STORE                                                    0:40:27   2/06/81  ****
                                                                                                CSYSUB          M77D

 0110420                                                    01 DOWP
 0110420 01 000420 106077 ------                            02        LR      R3,R15
 0110421 01 000421 010474 ------                            03        RRN     R3,12
 0110422 01 000422 006001 ------                            04        LR      R0,R1
 0110423 01 000423 022403 ------                            05        ZBR     R0,R3
 0110424 01 000424 022377 ------                            06        ZBN     R15,15
 0110425 01 000425 072754 ------                            07        HN      RA1,RA0             # SET UP RA0 FOR RETURN
 0110426 01 000426 072775 ------                            08        HN      RA1+1,RA0+1
 0110427 01 000427 024040 ------                            09        TBN     R2,0
 0110430 01 000430 054006 ------ 0110436                    10        BC      OFLWP
 0110431                                                    11        SBIN
 0110431 01 000431 013002 ------                  -001-     12        MIS     2
 0110432 01 000432 105722 ------                  -001-     13        DATA    35794
 0110433                                                    14        MST     0(RA1)
E0110433 01 000433 000420 ------                  -001-     15        MSTF    0(RA1)
 0110434 01 000434 136203 ------                  -001-     16        DATA    B(10111100010000011)
 0110435                                                    17        RETURN  0
 0110435 01 000435 056440 ------                  -001-     18        BTSAGN  0

 0110436                                                    20 OFLWP
 0110436                                                    21        MSTOS   0(RA1)
E0110436 01 000436 100420 ------                  -001-     22        MSTF    0(RA1)
 0110437 01 000437 136103 ------                  -001-     23        DATA    B(10111100010000011)
 0110440                                                    24        IF      CF THEN RETURN 2
 0110440 01 000440 055002 ------ 0110442          -002-     25            BNC     IFS319
 0110441 01 000441 056442 ------                  -003-     26            BTSAGN  2
 0110442                                          -002-     27 IFS319
 0110442                                                    28        RETURN  0
 0110442 01 000442 156440 ------                  -001-     29        BTSAGN  0
```

```
                                    -002- 01         *
                                    -002- 02         *        INITIALIZE MASC INCLUDING WRITE PROTECT
                                    -002- 03         *        ---------------------------------------
                                    -002- 04         *
                          05  * DESCRIPTION:
                          06  * INITIALIZE ALL ON-LINE OR OFF-LINE MAIN STORE CONTROLLERS (MASC)
                          07  * AND LOAD THEIR WRITE PROTECT REGISTERS.
                          08  *
                          09  * ENTRY POINTS:
                          10  * INITST
                          11  * INITOST
                          12  * WPST
                          13  * WPOST
                          14  *
                          15  * ENTRY CONDITIONS:
                          16  * NONE
                          17  *
                          18  * EXIT CONDITIONS:
                          19  * NONE
                          20  *
                          21  * RESTRICTIONS:
                          22  * MASCO IS NOT INITIALIZED AND IT IS ASSUMED THAT THIS
                          23  * SUBROUTINE IS LOADED IN MASO.


0110443                                       27         OFLSTR_PICTURE
OFLSTR_______________________________ -001- 28 #____________________________________________________________
00|                                                                                           | INITH |INITSTO|OFLSTIN|
 |*******************************************************************************************|       |       |       |
 |  15  |  14  |  13  |  12  |  11  |  10  |  9  |  8  |  7  |  6  |  5  |  4  |  3  |   2   |   1   |   0   |


0110443                                       37 INITOST
0110443                                       38         CALL    INIT_OCC
0110443 01 000443 137020 111240 0111240 -001- 39         BSA     INIT_OCC
0110445 01 000445 103003 ------               40         LN      RO,ES(INITSTO,OFLSTINIT)
0110446 01 000446 053010 ------ 0110456       41         B       WPSTMERGE
0110447                                       42 INITST
0110447 01 000447 103002 ------               43         LN      RO,ES(INITSTO)
0110450 01 000450 053006 ------ 0110456       44         B       WPSTMERGE
0110451                                       45 WPST
0110451 01 000451 103000 ------               46         LN      RO,0
0110452 01 000452 053004 ------ 0110456       47         B       WPSTMERGE
                                              48 CPATCH  BGNP    0(471)              # 11711
                                        -001- 49         NOTE    CPATCH 'CSECT'
                                        -001- 50         NOTE    ***************** PATCH AREA BEGINS AT 000471 ****************
```

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   INITIALIZE MASC INCLUDING WRITE PROTECT                                                    0:40:27   2/06/81  ****

                                                                                                        CSYSUB          W77D

0112123                                                  01 INITSTH                                  # HARD INIT ENTRY INTO INITST
0112123 02 000471 103006 ------                          02         LN       R0,E(S(INITSTO),S(INITH)) # SET ENTRY FLAGS
0112124 02 000472 037000 110456 0110456                  03         BL       WPSTMERGE
0112124                                                  04         ENDP     NR                        # 11711
                                                -001-    05         NOTE     ************ LAST PATCH ADDRESS USED IS 000473 ****************
                                                -001-    06         NOTE     ***** NUMBER OF PATCH WORDS USED IS 3 (DECIMAL) ********



0110453                                                  10 WPOST
0110453                                                  11         CALL     INIT_OCC                  # INSURE OFF-LINE STORE IS NOT ISOLATED
0110453 01 000453 137020 111240 0111240          -001-   12         BSA      INIT_OCC
0110455 01 000455 103001 ------                          13         LN       R0,ES(OFLSTINIT)

0110456                                                  15 WPSTMERGE
0110456                                                  16         BEGIN
0110456 01 000456 171420 ------                  -002-   17         HA
0110457 01 000457 006120 ------                          18         LR       OFLSTINIT,R0
0110460 01 000460 003101 ------ MASACS                   19         LN       R4,TBLSIZ(MASCIOSC)-1
0110461 01 000461 022100 ------                          20         ZBN      R4,0                      # DIVIDE TBLSIZ BY 2
0110462 01 000462 010501 ------                          21         RRN      R4,1
0110463                                                  22 INITSTLOOP
0110463 01 000463 103641 006061                          23         LI       R10,MASCINIT              # IO ORDER TO INITIALIZE MASC
                                                         24 CSYSUB  OW       0(465)                    # 11711
                                                -001-    25         NOTE     ************** THE FIRST ADDRESS OVERWRITTEN IS 000465 **********


0110465 01 000465 006000 ------                          28         NOP
0110466 01 000466 024122 ------                          29         TBN      OFLSTINIT,S(INITH)        # CHK IF HARD INIT REQUESTED
0110467                                                  30                                            # B IF NO.
0110467                                                  31         EOW                               # 11711
                                                -001-    32         NOTE     *************** THE LAST ADDRESS OVERWRITTEN IS 000466 **********


0110467                                                  35         IF       CF THEN LI R10,MASCINITH # IF THIS IS A BOOTSTRAP USE HARD  INIT
0110467 01 000467 055003 ------ 0110472          -002-   36             BNC      IFS342
0110470 01 000470 003641 000361                  -002-   37             LI       R10,MASCINITH    #
0110472                                          -002-   38 IFS342
0110472 01 000472 131021 016446 MASACS                   39         LAL      R1,MASCIOSC,RA0           # TABLE OF MAS IO PORT ADDRESSES
0110474 01 000474 043224 ------                          40         LAX      R9,R4(RA0)                # THIS PLUS NEXT LAX PERFORMS RA0=RA0+2*R4
0110475 01 000475 043224 ------                          41         LAX      R9,R4(RA0)                # INIT R9 TO MY STORE IO ADDRESS
0110476                                                  42         IF       OFLSTINIT THEN RGBEGIN # ENABLE ONLINE ACCESS TO OFFLINE MAS
0110476 01 000476 024120 ------                  -004-   43             TBN      OFLSTINIT,S(OFLSTINIT)
0110477 01 000477 055013 ------ 0110512          -002-   44             BNC      IFS344
                                                         45 R2           =        LDMCHB*E(4)
0110500 01 000500 003441 004620                  -004-   46             LI       R2,LDMCHB*E(4)
                                                         47 R3           =        R9
0110502 01 000502 006071 ------                  -004-   48             LR       R3,R9
0110503 01 000503 031420 110577 0110577                  49             LAL      R1,OSTTBL,RA1

   COMMON SYSTEM SUBROUTINES                                                                                PR-1C956-50

     0:40:27   2/06/81  TRADE SECRET - SEE TRADE SECRET RESTRICTIVE NOTICE ON COVER SHEET   CSYSUB    ISSUE  05      PAGE    34
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   INITIALIZE MASC INCLUDING WRITE PROTECT                                                    0:40:27    2/06/81  ****

                                                                                                        CSYSUB          W77D


0110505                                                  01            CALL    EXCMCHO
0110505 01 000505 037020 111224 0111224  -001-  02            BSA     EXCMCHO
0110507 01 000507 155022 ------ 0110531          03            BNC     WPSTERR
0110510 01 000510 040221 ------                  04            L       R9,1(RAO)
0110511 01 000511 053005 ------ 0110516          05            B       SENDINIT
0110512                                          06            RGEND
0110512                                  -001-   07 IFS344

0110512                                          09        IF      R4 = 0 THEN LI R10,MASCUNBK # CHANGE IO ORDER TO ONLY ENABLE BUS
0110512 01 000512 114104 ------          -002-   10            TZ      R4
0110513 01 000513 055003 ------ 0110516  -001-   11            BNC     IFS357
0110514 01 000514 003641 006060          -001-   12            LI      R10,MASCUNBK    # CHANGE IO ORDER TO ONLY ENABLE BUS
0110516                                  -001-   13 IFS357

0110516                                          15 SENDINIT
                                                 16 # TWO IO ORDERS ARE USED BELOW. THE FIRST ONE IS USED TO GUARANTEE
                                                 17 # THAT THE MASC IO IS INITIALIZED. THIS IS ACCOMPLISHED BY SENDING
                                                 18 # IT AND THEN IMMEDIATELY SENDING THE NEXT ONE WHICH CUTS OFF THE
                                                 19 # FIRST ORDER.  CUTTING IT OFF CAUSES THE CIRCUIT TO INITIALIZE ITSELF.
                                                 20 # THE SECOND SMIO IS THE ONE THAT ACTUALLY SEND THE INITIALIZATION ORDER
                                                 21 # TO THE MASC.  THE BLOCKING OF INTERRUPTS IS DONE TO GUARANTEE
                                                 22 # THAT THE SECOND SMIO WILL BE EXECUTED FAST ENOUGH TO CUT OFF THE FIRST.
0110516                                          23        SBIN
0110516 01 000516 113002 ------          -001-   24        MIS     2
0110517 01 000517 105722 ------          -001-   25        DATA    35794
0110520 01 000520 023440 ------                  26        SMIO
0110521 01 000521 023440 ------                  27        SMIO
0110522                                          28        ZBIN
0110522 01 000522 013002 ------          -001-   29        MIS     2
0110523 01 000523 107322 ------          -001-   30        DATA    36562
0110524 01 000524 003017 ------                  31        LN      R0,15
0110525 01 000525 136000 110525 0110525          32 SELF   BX      R0,SELF             #WASTE TIME FOR SMIO
0110527 01 000527 003240 ------                  33        ZR      R10
0110530 01 000530 023440 ------                  34        SMIO                        #CLEAR PREVIOUS ORDER
0110531                                          35 WPSTERR
0110531 01 000531 136100 110463 0110463          36        BX      R4,INITSTLOOP
0110533                                          37        IF      OFLSTINIT THEN CALL INIT_OCC # RETURN OTHER CC TO HALT LOOP
0110533 01 000533 024120 ------          -004-   38            TBN     OFLSTINIT,S(OFLSTINIT)
0110534 01 000534 055003 ------ 0110537  -002-   39            BNC     IFS362
0110535 01 000535 037020 111240 0111240  -003-   40            BSA     INIT_OCC
0110537                                  -002-   41 IFS362
0110537                                          42        IF      INITSTO THEN RETURN
0110537 01 000537 124121 ------          -004-   43            TBN     INITSTO,S(INITSTO)
0110540 01 000540 055002 ------ 0110542  -002-   44            BNC     IFS367
0110541 01 000541 056420 ------          -003-   45            BTSAG
0110542                                  -002-   46 IFS367
0110542 01 000542 130502 021637 TDATA            47        LL      R4,STRLIM
0110544 01 000544 016544 000003                  48        LRM     R6,R4,MSK(2)
0110546                                          49                                    # MOD PAIRS MINUS ONE FOR HIGHEST MAS

   COMMON SYSTEM SUBROUTINES                                                                          PR-1C956-50

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   INITIALIZE MASC INCLUDING WRITE PROTECT                                                    0:40:27   2/06/81  ****

                                                                                                        CSYSUB          W77D

 0110546 01 000546 010502 ------                    01          RRN     R4,2
 0110547 01 000547 003502 000003                    02          NI      R4,MSK(2)           # NUMBER OF MAS'S MINUS ONE
 0110551                                            03 WPSTLOOP
 0110551 01 000551 106344 ------                    04          LR      R14,R4
 0110552 01 000552 010756 ------                    05          RLN     R14,2
 0110553 01 000553 003360 ------                    06          ZR      R15                 # GUARANTEE RA1 CONTAINS ADDRESS OF AN EVEN
                                                                                              MAS MOD
 0110554 01 000554 031002 020013 TDATA              08          LAL     R0,WPTBL,RA0
 0110556                                            09 LDWPREGLP
 0110556 01 000556 142016 ------                    10          LX      R0,R14(RA0)
 0110557 01 000557 006000 ------                    11          NOP
 0110560                                            12          IF      OFLSTINIT THEN RGBEGIN
 0110560 01 000560 024120 ------            -004-   13              TBN     OFLSTINIT,S(OFLSTINIT)
 0110561 01 000561 055004 ------ 0110565    -002-   14              BNC     IFS372
 0110562                                            15              MSTOS   0(RA1)
E0110562 01 000562 000420 ------            -001-   16              MSTF    0(RA1)
 0110563 01 000563 136103 ------            -001-   17              DATA    B(1011110001000011)
 0110564 01 000564 053003 ------ 0110567            18              B       LDWPREGMERGE
 0110565                                            19              RGEND
 0110565                                    -001-   20 IFS372

 0110565                                            22          MST     0(RA1)
E0110565 01 000565 100420 ------            -001-   23          MSTF    0(RA1)
 0110566 01 000566 136203 ------            -001-   24          DATA    B(1011110010000011)
 0110567                                            25 LDWPREGMERGE
 0110567 01 000567 104741 ------                    26          AN      R14,1
 0110570 01 000570 006000 ------                    27          NOP
 0110571 01 000571 036140 110556 0110556            28          BX      R6,LDWPREGLP
 0110573 01 000573 003143 ------                    29          LN      R6,3                # MOD PAIRS MINUS ONE FOR ALL BUT HIGHEST
                                                                                              MAS
 0110574 01 000574 036100 110551 0110551            31          BX      R4,WPSTLOOP
 0110576                                            32          RETURN
 0110576 01 000576 056420 ------            -001-   33          BTSAG




 0110577                                            39 OSTTBL
 0110577 01 000577 000004 ------                    40          DATA    ENTRIES(OSTTBL)
 0110600 01 000600 006420 000000                    41          ADDR    0,MSTOP
                                                    42 # THIS CODE IS INTENDED TO WORK WITH BOTH THE OLD AND NEW MAS DESIGN.
                                                    43 # THE OLD DESIGN REQUIRES THAT THE MS REGISTER BE LOADED TO OVERRIDE THE
                                                    44 # IO DISABLE AND SEND IO ORDERS TO PROVIDE ACCESS.  THE NEW DESIGN
                                                    45 # REQUIRES ONLY THAT THE MS BE LOADED TO ALLOW ACCESS.  THE TWO MAINTENANCE
                                                    46 # STATES ARE NOT EXCLUSIVE AND REQUIRE ONLY ONE CONSTANT TO BE LOADED
                                                    47 # INTO THE MS.  LOADING A ONE WITH GOOD PARITY WILL SET BIT 0 AND THE PH BIT.
                                                    48 # BIT 0 OVERRIDES THE IO DISABLE AND THE PH BIT ENABLES IO ACCESS TO THE
                                                    49 # OFF-LINE MAS.
```

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   INITIALIZE MASC INCLUDING WRITE PROTECT                                  0:40:27   2/06/81  ****

                                                                                      CSYSUB          W77D

0110602 01 000602 000720 064631                  01        ADDR    R9%T*E(8)|MCHB%F,LDMIRL # SET UP TIO ADDRESS
0110604 01 000604 004620 000001                  02        ADDR    1,LDMCHB
0110606 01 000606 000720 106631                  03        ADDR    MS%T*E(8)|MCHB%F,LDMIRL # ENABLE ON-LINE CC IO ACCESS TO MAS
                           0000004               04 ENTRIES(OSTTBL) EQU (*-OSTTBL-1)/2
```

```
                                -002- 01        *
                                -002- 02        *       BEGIN OR STOP STORE UPDATE
                                -002- 03        *       --------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * ENABLE OR DISABLE THE AUTOMATIC UPDATING OF THE OTHER STORE
                    07  *
                    08  * ENTRY POINTS:
                    09  * STPSTUPD--STOP STORE UPDATE (DISABLE UPDATING)
                    10  *
                    11  * ENTRY CONDITIONS:
                    12  * NONE
                    13  *
                    14  * EXIT CONDITIONS:
                    15  * NONE


0110610                                          19 STPSTUPD
0110610                                          20         BEGIN
0110610 01 000610 171420 ------          -002- 21         HA
0110611 01 000611 003401 036260                  22         LI      R0,ES(BDSR1,BDSR0,IS01,IS00,REV1,RW1,RW0)
0110613                                          23         MIMODE
0110613 01 000613 013400 ------          -001- 24         MI      0
0110614                                          25         L       BR,R0
0110614 01 000614 070523 ------          -001- 26              VFD     8,BRXT 8,R0XF
0110615                                          27         BRXMMS
0110615 01 000615 145312 ------          -001- 28              DATA    BRXMMSX
0110616                                          29         ZMINT
0110616 01 000616 026750 ------          -001- 30              DATA    ZMINTX
0110617                                          31         CALL    STOPPSAU
0110617 01 000617 037020 003674 CBLM     -001- 32         BSA     STOPPSAU
0110621                                          33         RETURN
0110621 01 000621 156420 ------          -001- 34         BTSAG
```

```
                                -002- 01        *
                                -002- 02        *       UNLOAD AND LOAD MAINTENANCE CHANNEL STATE
                                -002- 03        *       ----------------------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * THESE TWO COMPLEMENTARY ROUTINES ARE ANALOGOUS TO THOSE
                    07  * FOR IO CHANNELS (UNLODIOC,LODIOC). THE MCHB AND MCHTR
                    08  * ARE UNLOADED, INCLUDING PARITY, AND THE STATE IS
                    09  * DETERMINED AS IDLE (COMPLETE) OR ERROR.
                    10  *
                    11  * ENTRY POINT:
                    12  * UNLODMCH
                    13  *
                    14  * ENTRY CONDITIONS:
                    15  * NONE
                    16  *
                    17  * EXIT CONDITIONS:
                    18  * R0 = SEE EXIT CONDITIONS FOR TMCH SUBROUTINE
                    19  * R2(5-0)=MCHTR(PH,PL,19-16)
                    20  * R3 = MCHTR(15-0)
                    21  * R4(5-0)=MCHB(PH,PL,19-16)
                    22  * R5 = MCHB(15-0)


0110622                                         26 UNLODMCH
0110622                                         27         BEGIN   ()
0110622 01 000622 112403 ------                  28         UNPK    MCHB
0110623 01 000623 057403 ------                  29         TSRPL   MCHB
0110624 01 000624 030044 ------                  30         ICF     R2,4
0110625 01 000625 057423 ------                  31         TSRPH   MCHB
0110626 01 000626 030045 ------                  32         ICF     R2,5
0110627 01 000627 006123 ------                  33         LR      R5,R3
0110630 01 000630 006102 ------                  34         LR      R4,R2
0110631                                         35         MIMODE  MCHTRXMCHB
0110631 01 000631 013000 ------         -001-    36         MIS     0
0110632 01 000632 026472 ------         -002-    37                 DATA    MCHTRXMCHBX
0110633 01 000633 012403 ------                  38         UNPK    MCHB
0110634 01 000634 057403 ------                  39         TSRPL   MCHB
0110635 01 000635 030044 ------                  40         ICF     R2,4
0110636 01 000636 057423 ------                  41         TSRPH   MCHB
0110637 01 000637 030045 ------                  42         ICF     R2,5
0110640                                         43         CALL    TMCH
0110640 01 000640 037020 111104 0111104 -001-    44         BSA     TMCH
0110642                                         45         RETURN
0110642 01 000642 156400 ------         -001-    46         BTSA
```

```
                    01  * ENTRY POINT:
                    02  * LODMCH
                    03  *
                    04  * ENTRY CONDITIONS:
                    05  * R0,R2,R3,R4,R5--SEE EXIT CONDITIONS FOR UNLODMCH
                    06  *
                    07  * EXIT CONDITIONS:
                    08  * MCHB AND MCHTR RESTORED


0110643                                          12 LODMCH
0110643                                          13       BEGIN
0110643 01 000643 171420 ------          -002-   14       HA
0110644 01 000644 007044 ------                  15       EXR     R2,R4              # RESTORE MCHB FIRST
0110645 01 000645 007065 ------                  16       EXR     R3,R5
0110646 01 000646 012000 ------                  17       PACK    MCHTR
0110647 01 000647 010444 ------                  18       RRN     R2,4
0110650 01 000650 006002 ------                  19       LR      R0,R2              # GATE TO R0 TO SETUP FOR INTERDATA LDPAR
                                                                                       MACRO
0110651                                          21       MIMODE
0110651 01 000651 013400 ------          -001-   22       MI      0
0110652                                          23       L       BR,R0
0110652 01 000652 070523 ------          -001-   24            VFD     8,BR%T 8,R0%F
0110653                                          25       LDPAR                      # RESTORE PARITY BITS
0110653 01 000653 025730 ------          -001-   26            DATA    LDPAR%
0110654                                          27       MCHTRXMCHB
0110654 01 000654 026472 ------          -001-   28            DATA    MCHTRXMCHB%
0110655                                          29       ZMINT
0110655 01 000655 026750 ------          -001-   30            DATA    ZMINT%
0110656 01 000656 006044 ------                  31       LR      R2,R4
0110657 01 000657 006065 ------                  32       LR      R3,R5
0110660 01 000660 012000 ------                  33       PACK    MCHTR
0110661 01 000661 010444 ------                  34       RRN     R2,4
0110662                                          35       MIMODE
0110662 01 000662 013400 ------          -001-   36       MI      0
0110663                                          37       L       BR,R2
0110663 01 000663 070526 ------          -001-   38            VFD     8,BR%T 8,R2%F
0110664                                          39       LDPAR                      # RESTORE PARITY BITS
0110664 01 000664 025730 ------          -001-   40            DATA    LDPAR%
0110665                                          41       ZMINT
0110665 01 000665 026750 ------          -001-   42            DATA    ZMINT%
0110666                                          43       RETURN
0110666 01 000666 056420 ------          -001-   44       BTSAG
```

```
                                -002- 01        *
                                -002- 02        *       UPDATE OFF-LINE TEMPORARY STORE FROM ON-LINE
                                -002- 03        *       ----------------------------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * COPY ON-LINE TEMPORARY STORE TO THE OFF-LINE STORE THROUGH THE USE
                    07  * OF CLEARING TABLES. THE OFF-LINE STORE IS FIRST HARDWARE INITIALIZED.
                    08  *
                    09  * ENTRY POINT:
                    10  * UPD_OTS
                    11  *
                    12  * ENTRY CONDITIONS:
                    13  * RA1 = BASE ADDRESS OF CLEARING TABLE MINUS ONE
                    14  * R1 = NUMBER OF ENTRIES TO USE
                    15  *
                    16  * EXIT CONDITIONS:
                    17  * SEE ZERO_TS


0110667                                         21 UPD_OTS
0110667                                         22      BEGIN
0110667 01 000667 171420 ------         -002- 23      HA
0110670 01 000670 003120 ------               24      LN      R5,UPDATELP-BPAXORG
0110671 01 000671 053006 ------ 0110677       25      B       STMERGE
```

```
                                    -002- 01        *
                                    -002- 02        *       COPY OFF-LINE TEMPORARY STORE TO ON-LINE
                                    -002- 03        *       ---------------------------------------
                                    -002- 04        *
                    05  * DESCRIPTION:
                    06  * COPY OFF-LINE TEMPORARY STORE TO THE ON-LINE STORE THROUGH THE USE
                    07  * OF CLEARING TABLES. THE COPY IS ONLY DONE IF THE
                    08  * ON-LINE CENTRAL CONTROL HAS ACCESS TO THE OFF-LINE STORE.
                    09  *
                    10  * ENTRY POINT:
                    11  * GET_OTS
                    12  *
                    13  * ENTRY CONDITIONS:
                    14  * RA1 = BASE ADDRESS OF CLEARING TABLE MINUS ONE
                    15  * R1 = NUMBER OF ENTRIES TO USE
                    16  *
                    17  * EXIT CONDITIONS:
                    18  * SEE ZERO_TS


0110672                                         22 GET_OTS
0110672                                         23         ABEGIN
0110672 01 000672 171420 ------          -001- 24         HA
0110673 01 000673 003123 ------                25         LN      R5,GET_OTSLP-BPAXORG
0110674 01 000674 053003 ------ 0110677        26         B       STMERGE
```

```
                                -002- 01        *
                                -002- 02        *       ZERO TEMPORARY STORE
                                -002- 03        *       --------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * ZERO TEMPORARY STORE THROUGH THE USE OF CLEARING TABLES.
                    07  *
                    08  * ENTRY POINT:
                    09  * ZERO_TS
                    10  *
                    11  * ENTRY CONDITIONS:
                    12  * RA1 = BASE ADDRESS OF CLEARING TABLE MINUS ONE
                    13  * R1  = NUMBER OF ENTRIES TO USE
                    14  *
                    15  * EXIT CONDITIONS:
                    16  * NONE
                    17  * WARNING--IF ZERO_TS IS USED TO CLEAR THE HG AREA,
                    18  *          R2-R15 WILL BE 0 ON RETURN.

 0110675                                    21      STBLKR_PICTURE
STBLKR                                  -001- 22 #
001 |                                           LENGTH                                                  |                       |
    |                                       LENGTH OF BLOCK                                             |   BASE ADDRESS OF BLOCK   |
01  |                                                                                                   |                       |
    | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

 0110675                                    34 ZERO_TS
 0110675                                    35      ABEGIN
 0110675 01 000675 171420 ------        -001- 36      HA
 0110676 01 000676 003126 ------              37      LN      R5,ZTS_ENTRY-BPAXORG


 0110677                                    41 STMERGE
 0110677 01 000677 106101 ------              42      LR      R4,R1
 0110700                                      43      GRTNADR R6              # SAVE RETURN ADDRESS IN CASE THE INPUT
                                                                                PARAMETERS  CAUSE THE HG AREA TO BE ZEROED
 0110700 01 000700 072140 ------        -001- 45      GN      R6,0
 0110701 01 000701 072161 ------        -001- 46      GN      R6+1,1
 0110702 01 000702 006316 ------              47      LR      RA0,RA1         # RA0=RA1
 0110703 01 000703 006337 ------              48      LR      RA0+1,RA1+1
 0110704 01 000704 053021 ------ 0110725      49      B       CHKINDEX
 0110705                                      50 TBLLOOP
 0110705 01 000705 141341 ------              51      LA      RA1,1(RA0)      # LOAD TABLE ENTRY
 0110706 01 000706 041361 ------              52      LA      RA1+1,1(RA0)
```

```
ZERO TEMPORARY STORE                                                                    0:40:27   2/06/81  ****

                                                                                                  CSYSUB          M77D

                                                01 R2     =       R14 & M(LENGTH) /RR S(LENGTH) + 1 # ISOLATE BLOCK LENGTH FOR
                                                                                                    INNER LOOP
0110707 01 000707 006056 ------           -004- 03            LR      R2,R14
0110710 01 000710 003442 177760           -004- 04            NI      R2,M(LENGTH)
0110712 01 000712 010444 ------           -005- 05            RRN     R2,S(LENGTH)
0110713 01 000713 004441 ------           -004- 06            AN      R2,1
0110714 01 000714 056005 ------                 07          BPAX    R5                  # SELECT INNER LOOP
0110715                                         08 BPAXORG


0110715                                         12 UPDATELP
0110715                                         13          CALL    MASONOFF
0110715 01 000715 137021 014412 MASACS    -001- 14          BSA     MASONOFF
0110717 01 000717 153006 ------ 0110725         15          B       CHKINDEX


0110720                                         19 GET_OTSLP
0110720                                         20          CALL    MASOFFON
0110720 01 000720 137021 014546 MASACS    -001- 21          BSA     MASOFFON
0110722 01 000722 153003 ------ 0110725         22          B       CHKINDEX


0110723                                         26 ZTS_ENTRY
0110723                                         27          CALL    MAS_ZERO
0110723 01 000723 137021 014574 MASACS    -001- 28          BSA     MAS_ZERO


0110725                                         32 CHKINDEX
0110725 01 000725 136100 110705 0110705         33          BX      R4,TBLLOOP
0110727                                         34          HRTNADR R6                  # RESTORE RETURN ADDRESS
0110727 01 000727 072540 ------           -001- 35          HN      R6,0
0110730 01 000730 072561 ------           -001- 36          HN      R6+1,1
0110731                                         37          RETURN
0110731 01 000731 056420 ------           -001- 38          BTSAG
```

```
MULTIPLE STORE CLEAR OR PATTERN WRITE SUBROUTINE                                0:40:27   2/06/81  ****
                                                                                CSYSUB          W77D

                                -002- 01        *
                                -002- 02        *       MULTIPLE STORE CLEAR OR PATTERN WRITE SUBROUTINE
                                -002- 03        *       ----------------------------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * THE MULTIPLE STORE WRITE SUBROUTINE CAN BE USED TO:
                    07  *         1. CLEAR A BLOCK OF 16 MEMORY WORDS
                    08  *         2. CLEAR A BLOCK OF A SPECIFIED NUMBER OF WORDS
                    09  *         3. WRITE A SPECIFIED PATTERN IN A SPECIFIED NUMBER OF WORDS.
                    10  *
                    11  * ENTRY POINTS:
                    12  *         1. CLR_16   - CLEAR A BLOCK OF 16 MEMORY WORDS WHOSE ADDRESS IS
                    13  *                       GIVEN IN RA1
                    14  *                       ENTRY CONDITIONS:
                    15  *                         RA1 = ADDRESS OF BLOCK TO BE CLEARED
                    16  *         2. CLR_WRDS - CLEAR A BLOCK OF N MEMORY WORDS WHOSE ADDRESS IS
                    17  *                       GIVEN IN RA1
                    18  *                       ENTRY CONDITIONS:
                    19  *                         RA1 = ADDRESS OF BLOCK TO BE CLEARED
                    20  *                         R0  = NUMBER OF WORDS N TO BE CLEARED (RIGHT ADJUSTED)
                    21  *         3. WRT_PTRN - WRITE A SPECIFIED PATTERN INTO A BLOCK OF N MEMORY WORDS
                    22  *                       WHOSE ADDRESS IS GIVEN IN RA1
                    23  *                       ENTRY CONDITIONS:
                    24  *                         RA1 = ADDRESS OF BLOCK TO BE CLEARED
                    25  *                         R0  = NUMBER OF WORDS N TO BE WRITTEN (RIGHT ADJUSTED)
                    26  *                         R1  = 16-BIT PATTERN TO BE WRITTEN IN EVERY WORD
                    27  *
                    28  * EXIT CONDITIONS:
                    29  * NONE

                          0000000           31 WRD_CNT EQUR   R0              # CONTAINS NUMBER OF WORDS TO BE WRITTEN
                          0000001           32 PTRN    EQUR   R1              # CONTAINS PATTERN TO BE WRITTEN (ALL ZEROES
                                                                               FOR CLEAR OPERATION
                          0000016           34 BAS_ADR EQUR   RA1             # CONTAINS FIRST ADDRESS OF BLOCK TO BE
                                                                               WRITTEN (CLEARED)

0110732 01 000732 103401 000020             37 CLR_16 LI      WRD_CNT,16      #SETUP TO CLEAR 16 WORDS

0110734                                     39 CLR_WRDS
                                            40 PTRN   =       0               #CLEAR PATTERN REGISTER TO WRITE ALL ZEROES
                                                                               FOR CLEAR OPERATION
0110734 01 000734 103020 ------     -004- 42           ZR      PTRN

0110735                                     44         BEGIN   ()
0110735 01 000735 136000 110740 0110740     45 WRT_PTRN BX     WRD_CNT,DOWRITE
0110737                                     46         RETURN
0110737 01 000737 056400 ------     -001- 47         BTSA
0110740 01 000740 146420 ------           48 DOWRITE STX     PTRN,WRD_CNT(BAS_ADR) # WRITE LAST WORD THROUGH FIRST WORD OF
                                                                                   BLOCK

COMMON SYSTEM SUBROUTINES                                                       PR-1C956-50
  0:40:27   2/06/81  TRADE SECRET - SEE TRADE SECRET RESTRICTIVE NOTICE ON COVER SHEET   CSYSUB    ISSUE 05      PAGE    45
```

```
   MULTIPLE STORE CLEAR OR PATTERN WRITE SUBROUTINE                                    0:40:27   2/06/81  ****
                                                                                                CSYSUB        W77D

0110741 01 000741 053774 ------ 0110735        01        B       WRT_PTRN          # TO DECREMENT INDEX
```

```
                                -002- 01        *
                                -002- 02        *       MULTIPLE LOAD SUBROUTINES
                                -002- 03        *       ------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * LOAD REGISTERS R2 THROUGH RN STARTING AT LOCATION
                    07  * SPECIFIED IN RA1.
                    08  *
                    09  * ENTRY POINTS:
                    10  * L2_2     LOAD R2
                    11  * L2_3     LOAD R2-R3
                    12  * L2_4     LOAD R2-R4
                    13  * L2_5     LOAD R2-R5
                    14  * L2_6     LOAD R2-R6
                    15  * L2_7     LOAD R2-R7
                    16  * L2_8     LOAD R2-R8
                    17  * L2_9     LOAD R2-R9
                    18  * L2_10    LOAD R2-R10
                    19  * L2_11    LOAD R2-R11
                    20  * L2_12    LOAD R2-R12
                    21  * L2_13    LOAD R2-R13
                    22  * L2_V     LOAD R2-REGISTER DETERMINED BY LOW 4 BITS OF R0
                    23  *
                    24  * ENTRY CONDITIONS:
                    25  * RA1 = ADDRESS OF STORE BLOCK FROM WHICH REGISTERS WILL BE LOADED
                    26  * R0(3-0)=REGISTER NUMBER OF LAST REGISTER TO BE LOADED (L2_V ONLY)
                    27  * R0(15-4)=ANYTHING
                    28  *     2<=R0<=13
                    29  *
                    30  * EXIT CONDITIONS:
                    31  * R0 = RETURN CODE (L2_V ONLY)
                    32  *   0--OUT-OF-RANGE INDEX, LOAD NOT DONE
                    33  *   2 THROUGH 13--LOAD PERFORMED
                    34  * R0 AND R1 GUARANTEED NOT DESTROYED (EXCEPT FOR L2_V)

0110742                                 37          BEGIN   ()
0110742                                 38 L2_V
                                        39 R1       =       ¬ R0 & MSK(4)       # CALCULATE INDEX
0110742 01 000742 115420 ------ -004- 40            COM     R1,R0
0110743 01 000743 003422 000017 -004- 41            NI      R1,MSK(4)
0110745 01 000745 056001 ------         42          BPAX    R1
0110746                                 43          RETURN  0                   # R15--ILLEGAL INPUT
0110746 01 000746 156460 ------ -001- 44            BTSAN   0
0110747                                 45          RETURN  0                   # R14--ILLEGAL INPUT
0110747 01 000747 156460 ------ -001- 46            BTSAN   0
0110750                                 47 L2_13
0110750 01 000750 140733 ------         48          L       R13,11(RA1)
0110751                                 49 L2_12
```

```
0110751 01 000751 140712 ------                01        L       R12,10(RA1)
0110752                                        02 L2_11
0110752 01 000752 140671 ------                03        L       R11,9(RA1)
0110753                                        04 L2_10
0110753 01 000753 140650 ------                05        L       R10,8(RA1)
0110754                                        06 L2_9
0110754 01 000754 140627 ------                07        L       R9,7(RA1)
0110755                                        08 L2_8
0110755 01 000755 140606 ------                09        L       R8,6(RA1)
0110756                                        10 L2_7
0110756 01 000756 140565 ------                11        L       R7,5(RA1)
0110757                                        12 L2_6
0110757 01 000757 140544 ------                13        L       R6,4(RA1)
0110760                                        14 L2_5
0110760 01 000760 140523 ------                15        L       R5,3(RA1)
0110761                                        16 L2_4
0110761 01 000761 140502 ------                17        L       R4,2(RA1)
0110762                                        18 L2_3
0110762 01 000762 140461 ------                19        L       R3,1(RA1)
0110763 01 000763 153003 ------ 0110766        20        B       L2_2
0110764                                        21        RETURN  0          # R1--ILLEGAL INPUT
0110764 01 000764 156460 ------         -001-  22        BTSAN   0
0110765                                        23        RETURN  0          # R0--ILLEGAL INPUT
0110765 01 000765 156460 ------         -001-  24        BTSAN   0
0110766                                        25 L2_2
0110766 01 000766 140440 ------                26        L       R2,0(RA1)
0110767                                        27        RETURN
0110767 01 000767 056400 ------         -001-  28        BTSA
```

```
                                    -002- 01        *
                                    -002- 02        *       MOVE BLOCK IN STORE
                                    -002- 03        *       ------------------
                                    -002- 04        *
                    05  * DESCRIPTION:
                    06  * TRANSFER A BLOCK OF N WORDS FROM LOCATION
                    07  * SPECIFIED IN RA0 TO LOCATION SPECIFIED IN RA1.
                    08  *
                    09  * ENTRY POINTS:
                    10  * MOVST--MOVE BLOCK IN STORE
                    11  *
                    12  * ENTRY CONDITIONS:
                    13  * R0 = NUMBER OF WORDS TO BE MOVED
                    14  * RA0 = STARTING ADDRESS OF SOURCE BLOCK
                    15  * RA1 = STARTING ADDRESS OF DESTINATION BLOCK
                    16  *
                    17  * EXIT CONDITIONS:
                    18  * NONE

0110770                                         21          BEGIN   ()
0110770                                         22  MOVSTLP
0110770 01 000770 142020 ------                 23          LX      R1,R0(RA0)
0110771 01 000771 046420 ------                 24          STX     R1,R0(RA1)
0110772                                         25  MOVST
0110772 01 000772 136000 110770 0110770         26          BX      R0,MOVSTLP
0110774                                         27          RETURN
0110774 01 000774 056400 ------         -001-   28          BTSA
```

```
                                -002- 01        *
                                -002- 02        *       MULTIPLE STORE SUBROUTINES
                                -002- 03        *       --------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * STORE REGISTERS R2 THROUGH RN STARTING AT LOCATION
                    07  * SPECIFIED IN RA1.
                    08  *
                    09  * ENTRY POINTS:
                    10  * ST2_2      STORE R2
                    11  * ST2_3      STORE R2-R3
                    12  * ST2_4      STORE R2-R4
                    13  * ST2_5      STORE R2-R5
                    14  * ST2_6      STORE R2-R6
                    15  * ST2_7      STORE R2-R7
                    16  * ST2_8      STORE R2-R8
                    17  * ST2_9      STORE R2-R9
                    18  * ST2_10     STORE R2-R10
                    19  * ST2_11     STORE R2-R11
                    20  * ST2_12     STORE R2-R12
                    21  * ST2_13     STORE R2-R13
                    22  * ST2_V      STORE R2-REGISTER DETERMINED BY LOW 4 BITS OF R0
                    23  *
                    24  * ENTRY CONDITIONS:
                    25  * RA1 = ADDRESS OF STORE BLOCK INTO WHICH REGISTERS SHOULD BE WRITTEN
                    26  * R0(3-0)=REGISTER NUMBER OF LAST REGISTER TO BE STORED (ST2_V ONLY)
                    27  * R0(15-4)=ANYTHING
                    28  *     2<=R0<=13
                    29  *
                    30  * EXIT CONDITIONS:
                    31  * R0 = RETURN CODE (ST2_V ONLY)
                    32  *   0--OUT-OF-RANGE INDEX, STORE NOT DONE
                    33  *   2 THROUGH 13--STORE PERFORMED
                    34  * R0 AND R1 GUARANTEED NOT DESTROYED (EXCEPT FOR ST2_V)

0110775                                 37          BEGIN   ()
0110775                                 38 ST2_V
                                        39 R1       =       ¬ R0 & MSK(4)       # CALCULATE INDEX
0110775 01 000775 115420 ------         -004- 40             COM     R1,R0
0110776 01 000776 003422 000017         -004- 41             NI      R1,MSK(4)
0111000 01 001000 056001 ------                 42          BPAX    R1
0111001                                         43          RETURN  0                   # R15--ILLEGAL INPUT
0111001 01 001001 156460 ------         -001- 44            BTSAN   0
0111002                                         45          RETURN  0                   # R14--ILLEGAL INPUT
0111002 01 001002 156460 ------         -001- 46            BTSAN   0
0111003                                 47 ST2_13
0111003 01 001003 144733 ------                 48          ST      R13,11(RA1)
0111004                                 49 ST2_12
```

```
0111004 01 001004 144712 ------                    01          ST      R12,10(RA1)
0111005                                            02 ST2_11
0111005 01 001005 144671 ------                    03          ST      R11,9(RA1)
0111006                                            04 ST2_10
0111006 01 001006 144650 ------                    05          ST      R10,8(RA1)
0111007                                            06 ST2_9
0111007 01 001007 144627 ------                    07          ST      R9,7(RA1)
0111010                                            08 ST2_8
0111010 01 001010 144606 ------                    09          ST      R8,6(RA1)
0111011                                            10 ST2_7
0111011 01 001011 144565 ------                    11          ST      R7,5(RA1)
0111012                                            12 ST2_6
0111012 01 001012 144544 ------                    13          ST      R6,4(RA1)
0111013                                            14 ST2_5
0111013 01 001013 144523 ------                    15          ST      R5,3(RA1)
0111014                                            16 ST2_4
0111014 01 001014 144502 ------                    17          ST      R4,2(RA1)
0111015                                            18 ST2_3
0111015 01 001015 144461 ------                    19          ST      R3,1(RA1)
0111016 01 001016 153003 ------ 0111021            20          B       ST2_2
0111017                                            21          RETURN  0          # R1--ILLEGAL INPUT
0111017 01 001017 156460 ------          -001-     22          BTSAN   0
0111020                                            23          RETURN  0          # R0--ILLEGAL INPUT
0111020 01 001020 156460 ------          -001-     24          BTSAN   0
0111021                                            25 ST2_2
0111021 01 001021 144440 ------                    26          ST      R2,0(RA1)
0111022                                            27          RETURN
0111022 01 001022 056400 ------          -001-     28          BTSA
```

```
                                -002- 01        *
                                -002- 02        *       SEND AND TEST IO
                                -002- 03        *       ----------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * USED TO SEND IO ORDERS AND/OR TEST FOR A RESPONSE
                    07  * TESTS ARE MADE FOR BOTH THE NORMAL AND MTC RESPONSES
                    08  * THE POSSIBILITIES OF NO RESPONSE OR A BAD RESPONSE ARE ALSO COVERED.
                    09  *
                    10  * ENTRY POINTS:
                    11  * SIO----AN SIO INSTRUCTION FOLLOWED BY TESTIO
                    12  * SMIO---AN SMIO INSTRUCTION FOLLOWED BY TESTIO
                    13  * TESTIO-LOOK FOR RESPONSE FROM THE PERIPHERAL DEVICE.
                    14  *
                    15  * ENTRY CONDITIONS:
                    16  * R9 = CHANNEL/SUBCHANNEL (IN STANDARD FORMAT) TO BE ACCESSED
                    17  *
                    18  * EXIT CONDITIONS:
                    19  * R0 = RETURN CODE
                    20  *      0--NORMAL RESPONSE MESSAGE (START CODE 101)
                    21  *      1--MTC RESPONSE MESSAGE (START CODE 011)
                    22  *      2--FAIL, NO RESPONSE OR BAD PARITY ON RESPONSE MESSAGE
                    23  * R11 = RESPONSE MESSAGE
                    24  *
                    25  * IF RESPONSE HAD BAD PARITY, THE 'IOBADPAR' BIT AS DEFINED
                    26  * BY CINIT HAS BEEN SET IN TEMPORARY STORE WORD 'IOFLAGS'.
                    27  * THE RESPONSE (WITH CORRECTED PARITY) IS IN WORD 'SAVIOD' AND R11 = 0.
                                    28 # WHEN THE TIO OR TMIO INSTRUCTION IS EXECUTED, THE BUS PARITY
                                    29 # CHECKER IS DIVERTED TO AN INTERRUPT.  THUS, IF THE IOD HAS BAD
                                    30 # PARITY AND THE CHANNEL IS COMPLETE, AN INTERRUPT IS GENERATED
                                    31 # IMMEDIATELY FOLLOWING THE TIO (TMIO) INSTRUCTION.  THE INTERRUPT
                                    32 # 'CLEANS UP' THE CC AND SAVES THE ABOVE DATA FOR LATER ANALYSIS.
                                    33 # THE CF IS SET TO SIMULATE TIME-OUT AND FORCE THE SUBROUTINE DOWN
                                    34 # THE FAIL BRANCH.


0111023                             38 SMIO
0111023 01 001023 123440 ------     39          SMIO
0111024 01 001024 053002 ------ 0111026 40      B       TESTIO

0111025                             42 SIO
0111025 01 001025 123400 ------     43          SIO

0111026                             45 TESTIO
0111026 01 001026 103003 ------     46          LN      R0,IOWAIT       # NUMBER OF LOOPS TO BE EXECUTED BEFORE NO
                                                                          RESPONSE RETURN
0111027                             48                                  # EACH LOOP IS ABOUT 8.25 MICROSECONDS.
0111027                             49          BEGIN   ()
```

```
0111027                                                  01 TESTIOLP
0111027 01 001027 123500 ------                          02         TIO
0111030                                                  03         IF      CF THEN RETURN 0
0111030 01 001030 055002 ------ 0111032          -002-   04             BNC     IFS522
0111031 01 001031 056460 ------                  -003-   05             BTSAN   0
0111032                                          -002-   06 IFS522
0111032 01 001032 123520 ------                          07         TMIO
0111033                                                  08         IF      CF THEN RETURN 1
0111033 01 001033 055002 ------ 0111035          -002-   09             BNC     IFS525
0111034 01 001034 056461 ------                  -003-   10             BTSAN   1
0111035                                          -002-   11 IFS525
0111035 01 001035 13600U 111027 0111027                  12         BX      R0,TESTIOLP
0111037 01 001037 023560 ------                          13         IIO                     # INSURE CHANNEL IS IDLE
0111040                                                  14         RETURN  2
0111040 01 001040 056462 ------                  -001-   15         BTSAN   2
```

```
SEND IO ORDER AND RETRY ON FAILURE                                   0:40:27   2/06/81  ****
                                                                                CSYSUB        W77D

                                    -002- 01        *
                                    -002- 02        *       SEND IO ORDER AND RETRY ON FAILURE
                                    -002- 03        *       ---------------------------------
                                    -002- 04        *
                    05  * DESCRIPTION:
                    06  * SEND IO ORDER (EITHER NORMAL OR MTC) AND TEST FOR
                    07  * A RESPONSE. IF THERE IS NONE OR THE RESPONSE INDICATES
                    08  * AN IO ERROR, PERFORM A SINGLE RETRY OF THE SAME ORDER.
                    09  *
                    10  * ENTRY POINTS:
                    11  * SENDIO---USE NORMAL SEND ORDERS AND RETRY ON MTC RESPONSE OR ERROR
                    12  * SENDIOS--USE NORMAL SEND ORDERS AND RETRY ONLY ON ERROR
                    13  * SENDMIO--USE MTC SEND ORDERS AND RETRY ON MTC RESPONSE OR ERROR
                    14  * SENDMIOS-USE MTC SEND ORDERS AND RETRY ONLY ON ERROR
                    15  *
                    16  * ENTRY CONDITIONS:
                    17  * R9 = CHANNEL/SUBCHANNEL (IN STANDARD FORMAT) TO BE ACCESSED
                    18  *
                    19  * EXIT CONDITIONS:
                    20  * SEE TESTIO SUBROUTINES.


 0111041                                    23       IOMSGR_PICTURE
IOMSGR                                 -001- 24 #
001 |*****************************************************************************************************************| SPLIO | MTCIO |
    | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 |  1  |  0  |


 0111041                                    33 SENDIO
 0111041 01 001041 122021 ------             34       ZBN     SPLIO,S(SPLIO)
 0111042 01 001042 053002 ------ 0111044    35       B       IOSEND

 0111043                                    37 SENDIOS
 0111043 01 001043 126021 ------             38       SBN     SPLIO,S(SPLIO)
 0111044                                    39 IOSEND
 0111044                                    40       CALL    SIO
 0111044 01 001044 137020 111025 0111025 -001- 41    B3A     SIO
 0111046 01 001046 122020 ------             42       ZBN     MTCIO,S(MTCIO)
 0111047 01 001047 053006 ------ 0111055    43       B       IOTEST

 0111050                                    45 SENDMIO
 0111050 01 001050 122021 ------             46       ZBN     SPLIO,S(SPLIO)
 0111051 01 001051 053002 ------ 0111053    47       B       MIOSEND
```

SEND IO ORDER AND RETRY ON FAILURE 0:40:27 2/06/81 **** CSYSUB W77D

```
0111052                                                  01 SENDMIOS
0111052 01 001052 126021 ------                          02         SBN     SPLIO,S(SPLIO)

0111053                                                  04 MIOSEND
0111053                                                  05         CALL    SMIO
0111053 01 001053 173041 ------                  -001-   06         BSAI    SXMIO                # SUBROUTINE SMIO IS IN PROGRAM CSYSUB
0111054 01 001054 126020 ------                          07         SBN     MTCIO,S(MTCIO)
0111055                                                  08 IOTEST
0111055 01 001055 156000 ------                          09         BPAX    R0                   # TEST RETURN CODE
0111056                                                  10         RETURN                       # NORMAL CHANNEL RETURN
0111056 01 001056 156400 ------                  -001-   11         BTSA
0111057 01 001057 153010 ------ 0111067                  12         B       MTCRTN               # MTC RESPONSE FROM CHANNEL
                                                         13 # NO CHANNEL RETURN OR BAD PARITY ON RETURN
0111060                                                  14 IORETRY
0111060                                                  15         IF      MTCIO THEN B MTCRETRY
0111060 01 001060 124020 ------                  -004-   16             TBN     MTCIO,S(MTCIO)
0111061 01 001061 054004 ------ 0111065         -002-   17             BC      MTCRETRY
0111062                                                  18         CALL    SIO
0111062 01 001062 037020 111025 0111025          -001-   19         BSA     SIO
0111064                                                  20         RETURN
0111064 01 001064 156400 ------                  -001-   21         BTSA

0111065                                                  23 MTCRETRY
0111065                                                  24         CALL    SMIO
0111065 01 001065 173041 ------                  -001-   25         BSAI    SXMIO                # SUBROUTINE SMIO IS IN PROGRAM CSYSUB
0111066                                                  26         RETURN
0111066 01 001066 156400 ------                  -001-   27         BTSA




0111067                                                  33 MTCRTN
0111067                                                  34         IF      ¬ SPLIO THEN B IORETRY
0111067 01 001067 124021 ------                  -004-   35             TBN     SPLIO,S(SPLIO)
0111070 01 001070 055770 ------ 0111060         -002-   36             BNC     IORETRY
0111071                                                  37         RETURN
0111071 01 001071 056400 ------                  -001-   38         BTSA
```

```
                                    -002- 01        *
                                    -002- 02        *       SEND AND TEST MCH
                                    -002- 03        *       ----------------
                                    -002- 04        *
                          05  * DESCRIPTION:
                          06  * USED TO SEND A MCH MESSAGE AND TEST FOR THE RESPONSE
                          07  *
                          08  * ENTRY POINTS:
                          09  * SLDMCHB--SET R0 = LDMCHB + DO SMCH
                          10  * SLDMIRL--SET R0 = LDMIRL + DO SMCH
                          11  * SMCH
                          12  *
                          13  * ENTRY CONDITIONS:
                          14  * FOR SMCH ENTRY POINT ONLY-
                          15  * R0 = FCN CODE TO BE SENT (AS LOADED BY LMCH MACRO)
                          16  * FOR ALL ENTRY POINTS-
                          17  * MCHTR = DATA TO BE SENT (IF ANY)
                          18  *
                          19  * EXIT CONDITIONS:
                          20  * R0 = RETURN CODE
                          21  *      0--NORMAL RESPONSE MESSAGE
                          22  *      1--FAIL, NO RESPONSE OR MCH ERROR OCCURRED
                          23  * MCHB = RESPONSE MESSAGE



0111072                                     29 SLDMCHB
0111073 01 001072 103401 000231             30          LI      R0,LDMCHB
0111074 01 001074 053003 ------ 0111077     31          B       SMCH


0111075                                     35 SLDMIRL
0111075 01 001075 103401 000035             36          LI      R0,LDMIRL


0111077                                     40 SMCH
0111077                                     41          BEGIN   ()
0111077                                     42          MIMODE
0111077 01 001077 113400 ------     -001- 43          MI      0
0111100                                     44          L       MCHC,R0
0111100 01 001100 160523 ------     -001- 45                VFD     8,MCHCXT 8,R0XF
0111101                                     46          LDSTMCH
0111101 01 001101 134072 ------     -001- 47                DATA    LDSTMCHX
0111102                                     48          STMCH
0111102 01 001102 134330 ------     -001- 49                DATA    STMCHX
```

SEND AND TEST MCH 0:40:27 2/06/81 ****

CSYSUB W77D

```
0111103                                  01        ZMINT
0111103 01 001103 026750 ------    -001- 02          DATA    ZMINT%
```

```
                                    -002- 01        *
                                    -002- 02        *       TEST MCH STATE
                                    -002- 03        *       --------------
                                    -002- 04        *
                          05  * DESCRIPTION:
                          06  * GATE MCH STATUS BITS TO R0 FOR TESTING
                          07  *
                          08  * ENTRY POINT:
                          09  * TMCH
                          10  *
                          11  * ENTRY CONDITIONS:
                          12  * NONE
                          13  *
                          14  * EXIT CONDITIONS:
                          15  * R0 = RETURN CODE
                          16  *   0--MCH COMPLETE WITHOUT AN ERROR
                          17  *   1--MCH FAILURE


0111104                                             21 TMCH
0111104                                             22          BEGIN   ()
0111104 01 001104 172442 ------                     23          HN      R2,2                # SAVE R2 AND R3
0111105 01 001105 072463 ------                     24          HN      R3,3
0111106 01 001106 012417 ------                     25          UNPK    SS                  # GET VALUE OF BIN
0111107 01 001107 015463 ------                     26          COM     R3                  # COM BIN
0111110 01 001110 003462 000004                     27          NI      R3,M(BIN)           # BIN WILL NOW BE SET AND RESET ONLY IF IT
                                                                                              WAS 0
0111112 01 001112 003044 ------                     29          LN      R2,E(S(BPC)-16)
0111113 01 001113 012320 ------                     30          PACK    SS_S                # BLOCK PARITY CHECK
0111114                                             31          MIMODE
0111114 01 001114 013400 ------             -001-   32          MI      0
0111115                                             33          L       CR,NOP              # ZERO CR BECAUSE TMCH OR'S MCHC ON TOP OF IT
0111115 01 001115 031760 ------             -001-   34              VFD     8,CR%T 8,NOP%F
0111116                                             35          TMCH
0111116 01 001116 016730 ------             -001-   36              DATA    TMCH%
0111117                                             37          L       R0,CR
0111117 01 001117 051463 ------             -001-   38              VFD     8,R0%T 8,CR%F
0111120                                             39          ZMINT
0111120 01 001120 026750 ------             -001-   40              DATA    ZMINT%
0111121 01 001121 014000 ------                     41          NR      R0,R0               # CORRECT PARITY
0111122 01 001122 012360 ------                     42          PACK    SS_R                # RESTORE PARITY CHECK
0111123 01 001123 072042 ------                     43          GN      R2,2                # RESTORE R2 AND R3
0111124 01 001124 072063 ------                     44          GN      R3,3
0111125 01 001125 017400 001401                     45          CIRM    R0,ES(MCHCP),0,ES(MCHER,MCHCP) # DID MCH COMPLETE WITHOUT AN
                                                                                                      ERROR
0111127                                             47          IF      CF THEN RETURN 0
0111127 01 001127 055002 ------ 0111131    -002-   48              BNC     IFS577
0111130 01 001130 056460 ------             -003-   49              BTSAN   0
```

```
TEST MCH STATE                                                                  0:40:27   2/06/81  ****
                                                                                        CSYSUB          M77D

0111131                                  -002- 01 IFS577
0111131                                        02        BEGIN
0111131 01 001131 171420 ------          -002- 03        HA
0111132                                        04        MIMODE  IDLMCH              # BECAUSE IT DID NOT COMPLETE NORMALLY
0111132 01 001132 013000 ------          -001- 05        MIS     0
0111133 01 001133 154330 ------          -002- 06            DATA    IDLMCH%
0111134 01 001134 031400 043026 CTSD           07        LAL     R0,SYSTATE,RA1
0111136 01 001136 061700 ------                08        SBS     0(RA1),$(MCH_OOS)   # MARK MCH OUT-OF-SERVICE
0111137                                        09        RETURN  1
0111137 01 001137 056441 ------          -001- 10        BTSAGN  1
```

```
                                    -002- 01        *
                                    -002- 02        *       SEND AND TEST BACKUP MAINTENANCE CHANNEL
                                    -002- 03        *       ---------------------------------------
                                    -002- 04        *
                    05  * DESCRIPTION:
                    06  * USED TO SEND ORDERS TO THE OTHER CC VIA THE SO CALLED
                    07  * BACKUP MAINTENANCE CHANNEL. IN REALITY THIS MODE USES
                    08  * THE OTHER STORE WRITE FACILITY AND THE OTHER CC
                    09  * INTERRUPT.
                    10  *
                    11  * ENTRY POINT:
                    12  * SBUMCH
                    13  *
                    14  * ENTRY CONDITIONS:
                    15  * R0 = FUNCTION CODE
                    16  *   0--SPARE
                    17  *   1--STOP
                    18  *   2--COMPLETE NORMAL SWITCH
                    19  *   3--CLEAR PROGRAM TIMER
                    20  * R1 = DATA TO PASS (IF ANY)
                    21  *
                    22  * EXIT CONDITIONS:
                    23  * R0 = RETURN CODE
                    24  *   0--SUCCESS
                    25  *   1--FAILURE, NO RESPONSE OR OTHER STORE ERROR


0111140                                             29 SBUMCH
0111140                                             30         BEGIN
0111140 01 001140 171420 ------             -002-   31         HA
0111141 01 001141 030440 043026 CTSD                32         LL      R2,SYSTATE
0111143 01 001143 024052 ------ CBLM                33         TBN     R2,S(MAS_OOS)
0111144                                             34         IF      CF THEN RETURN 1
0111144 01 001144 055002 ------ 0111146    -002-   35             BNC     IFS594
0111145 01 001145 056441 ------            -003-   36             BTSAGN  1
0111146                                    -002-   37 IFS594
                                                    38 # SBUMCH MAY BE CALLED EARLY IN INITIALIZATION WHEN MCHFCN MAY
                                                    39 # STILL HAVE BAD PARITY HENCE THE ZR-STAL RATHER THAN AN LAL TO
                                                    40 # SET UP RA1.
0111146 01 001146 103040 ------                     41         ZR      R2
0111147 01 001147 035440 043342 CTSD                42         STAL    R2,MCHFCN,RA1
0111151                                             43         STOS    0(RA1)
E0111151 01 001151 000420 ------           -001-    44         MSTF    0(RA1)
0111152 01 001152 136100 ------            -001-    45         DATA    B(10111100010000000)
0111153                                             46         IF      CF THEN RETURN 1
0111153 01 001153 055002 ------ 0111155    -002-    47             BNC     IFS598
0111154 01 001154 056441 ------            -003-    48             BTSAGN  1
0111155                                    -002-    49 IFS598
```

SEND AND TEST BACKUP MAINTENANCE CHANNEL 0:40:27 2/06/81 ****

CSYSUB W77D

```
 0111155 01 001155 106001 ------              01      LR      R0,R1
 0111156                                      02      STOS    1(RA1)
E0111156 01 001156 000421 ------        -001- 03      MSTF    1(RA1)
 0111157 01 001157 136100 ------        -001- 04      DATA    B(1011110001000000)
 0111160                                      05      MIMODE  IOCC
 0111160 01 001160 013000 ------        -001- 06      MIS     0
 0111161 01 001161 016750 ------        -002- 07            DATA    IOCC%
 0111162                                      08      RETURN  0
 0111162 01 001162 056440 ------        -001- 09      BTSAGN  0
```

```
                                -002- 01        *
                                -002- 02        *       SYNCHRONIZE BASE LEVEL WITH INTERRUPTS
                                -002- 03        *       ---------------------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * THIS SUBROUTINE ALLOWS A BASE LEVEL PROGRAM TO SYNCHRONIZE
                    07  * WITH THE TI (USUALLY A TIMED INTERRUPT). IT IS USED WHEN
                    08  * THE PROGRAM MUST EXECUTE A SIGNIFICANT AMOUNT OF CODE
                    09  * WITHOUT BEING INTERRUPTED. TO AVOID INTERRUPTS
                    10  * BIN IS SET, BUT THIS CAN CAUSE UNDESIRABLE
                    11  * JITTER IN THE START OF THE TIMED INTERRUPT. TO AVOID THIS
                    12  * THE PROGRAM CAN CHECK THAT IT HAS SUFFICIENT TIME TO COMPLETE
                    13  * AND THEN BLOCK INTERRUPTS KNOWING IT WILL NOT DELAY
                    14  * THE NEXT ONE.
                    15  *
                    16  * ENTRY POINTS:
                    17  * INSYNC
                    18  *
                    19  * ENTRY CONDITIONS:
                    20  * R0 = A CONSTANT WHICH CONTAINS 1'S IN THE BIT
                    21  *      POSITIONS WHERE THE TI WILL BE REQUIRED
                    22  *      TO HAVE 0'S BEFORE INSYNC WILL RETURN.
                    23  *   SINCE BIT 3 OF THE TI CORRESPONDS TO 1.25 MS, R0=E(3) WILL
                    24  *   GUARANTEE AT LEAST 1.25 MS BEFORE THE NEXT TIMED INTERRUPT.
                    25  *
                    26  * EXIT CONDITIONS:
                    27  * INTERRUPTS ARE BLOCKED (BIN IS SET)

0111163                                     30 INSYNC
0111163                                     31      BEGIN   (R2,R3,R4)
0111163 01 001163 172442 ------     -002- 32      HN      R2,2
0111164 01 001164 072463 ------     -002-;33      HN      R3,3
0111165 01 001165 072504 ------     -002- 34      HN      R4,4
0111166                                     35 INSYNCLP
0111166                                     36      ZBIN                    # ALLOW INTERRUPTS TO OCCUR THAT ARRIVED
                                                                              DURING LAST LOOP
0111166 01 001166 113002 ------     -001- 38      MIS     2
0111167 01 001167 107322 ------     -001- 39      DATA    36562
0111170                                     40      SBIN
0111170 01 001170 013002 ------     -001- 41      MIS     2
0111171 01 001171 105722 ------     -001- 42      DATA    35794
0111172                                     43      GETTI
0111172 01 001172 112400 ------     -001- 44      UNPK    TI
0111173 01 001173 006103 ------     -001- 45      LR      R4,R3
0111174 01 001174 012400 ------     -001- 46      UNPK    TI
0111175 01 001175 020103 ------     -001- 47      CR      R4,R3
0111176 01 001176 055774 ------ 0111172 -001- 48      BNC     TRY614
0111177 01 001177 014060 ------             49      NR      R3,R0           # IS THERE ENOUGH TIME BEFORE NEXT INTERRUPT
```

SYNCHRONIZE BASE LEVEL WITH INTERRUPTS


```
0111200 01 001200 055766 ------ 0111166        01      BNC     INSYNCLP        # IF NOT, LET INTERRUPTS OCCUR AND TRY AGAIN
0111201                                        02      RETURN
0111201 01 001201 072042 ------          -001- 03      GN      R2,R2
0111202 01 001202 072063 ------          -001-;04      GN      R3,R3
0111203 01 001203 072104 ------          -001- 05      GN      R4,R4
0111204 01 001204 056400 ------          -001- 06      BTSA
```

```
                                    -002- 01        *
                                    -002- 02        *       DETERMINE CURRENTLY ACTIVE INTERRUPT
                                    -002- 03        *       ------------------------------------
                                    -002- 04        *
                    05  * DESCRIPTION:
                    06  * DETERMINE FROM WHICH INTERRUPT THIS SUBROUTINE
                    07  * HAS BEEN CALLED.
                    08  *
                    09  * ENTRY POINT:
                    10  * INTCHK
                    11  *
                    12  * ENTRY CONDITIONS:
                    13  * NONE
                    14  *
                    15  * EXIT CONDITIONS:
                    16  * R0 = NUMBER OF CURRENTLY ACTIVE INTERRUPT (16 = BASE LEVEL)


 0111205                                    20 INTCHK
 0111205                                    21          BEGIN   ()
E0111205 01 001205 121034 ------            22          LRS     R1,IM
                                           23 R1        =       ¬ R1 | IM_IMAGE
 0111206 01 001206 015421 ------    -004-  24              COM     R1,R1
 0111207 01 001207 030400 043021 CTSD -004- 25              LL      R0,IM_IMAGE
 0111211 01 001211 014420 ------    -004-  26              OR      R1,R0
                                           27 R0        =       16                  # INIT TO BASE LEVEL--IF FLZ FAILS R0 IS
                                                                                      LEFT UNCHANGED
 0111212 01 001212 003401 000020    -004-  29              LI      R0,16
 0111214 01 001214 020420 ------           30          FLZ     R1,R0               # DETERMINE HIGHEST PRIORITY (LOWEST NUMBER)
                                                                                      BIT THAT IS CURRENTLY BUT NOT NORMALLY
                                                                                      BLOCKED
 0111215                                    33          RETURN
 0111215 01 001215 056400 ------    -001-  34          BTSA
```

EXECUTE A SERIES OF MCH ORDERS 0:40:27 2/06/81 ****

CSYSUB W77D

```
                                -002- 01        *
                                -002- 02        *       EXECUTE A SERIES OF MCH ORDERS
                                -002- 03        *       ------------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * EXECUTE A SERIES OF MCH ORDERS AS SPECIFIED IN
                    07  * A TABLE. EACH TWO WORD TABLE ENTRY IS AN ORDER.
                    08  * THE ORDERS ARE EXECUTED SEQUENTIALLY.
                    09  *
                    10  * ENTRY POINTS:
                    11  * EXCMCH---TABLE ONLY
                    12  * EXCMCHO--OPTIONAL FIRST ORDER PLUS TABLE
                    13  *
                    14  * ENTRY CONDITIONS:
                    15  * RA1 = TABLE ADDRESS MINUS ONE
                    16  * R1 = TABLE LENGTH
                    17  * R2-R3 = OPTIONAL FIRST ORDER (EXCMCHO ONLY)
                    18  *
                    19  * EXIT CONDITIONS:
                    20  * R0 = RETURN CODE
                    21  *   0--SUCCESS
                    22  *   1--FAILURE ON SOME MCH TRANSMISSION
                    23  *
                    24  * RESTRICTIONS:
                    25  * ORDER ENTRIES MUST BE IN THE FOLLOWING FORMAT:
                    26  * WORD0(11-4)--8-BIT MCH ORDER
                    27  * WORD0(3-0)--MOST SIGNIFICANT-BITS OF A 20 BIT CONSTANT
                    28  * WORD1(15-0)--LEAST SIGNIFICANT-BITS OF A 20 BIT CONSTANT
                    29  * FIRST ORDER MAY NOT BE LDMIRL UNLESS OFF-LINE CC IS ALREADY STOPPED


0111216                                         33      MCHORDER_PICTURE
MCHORDER                                -001- 34 #
00 |                        |NOLDTR |                                                        |
   |************************|       |                4-OUT-OF-8 CODE MCH ORDER               |
01 |                                                                                        |
   |  15 |  14 |  13 |  12 |  11 |  10 |  9 |  8 |  7 |  6 |  5 |  4 |  3 |  2 |  1 |  0  |

0111216                                         44 EXCMCH
0111216                                         45      BEGIN
0111216 01 001216 171420 ------         -002-   46      HA
0111217                                         47 EXCMCHMG
0111217 01 001217 141441 ------                 48      LA      R2,1(RA1)
0111220 01 001220 041461 ------                 49      LA      R3,1(RA1)
0111221 01 001221 036020 111225 0111225         50      BX      R1,EXCMCHLP
0111223                                         51      RETURN  0
0111223 01 001223 056440 ------         -001-   52      BTSAGN  0
```

COMMON SYSTEM SUBROUTINES PR-1C956-50

```
EXECUTE A SERIES OF MCH ORDERS                                                    0:40:27   2/06/81  ****

                                                                                          CSYSUB          W77D

0111224                                                  01 EXCMCHO
0111224                                                  02         ABEGIN
0111224 01 001224 171420 ------              -001-       03         HA
0111225                                                  04 EXCMCHLP
0111225                                                  05         IF       ¬ NOLDTR THEN PACK MCHTR
0111225 01 001225 124054 ------              -004-       06              TBN      NOLDTR,S(NOLDTR)
0111226 01 001226 054002 ------ 0111230      -002-       07              BC       IFS646
0111227 01 001227 012000 ------              -002-       08              PACK     MCHTR            #
0111230                                      -002-       09 IFS646
0111230 01 001230 110444 ------                          10         RRN      R2,4                  # ALIGN MCH CODE FOR LOAD MCHC
0111231 01 001231 006002 ------                          11         LR       R0,R2                 # SET UP FOR SMCH SUBROUTINE
0111232                                                  12         CALL     SMCH                  # SEND ORDER
0111232 01 001232 073027 ------              -001-       13         BSAI     SMCH                  # SUBROUTINE SMCH IS IN PROGRAM CSYSUB
0111233                                                  14         IF       CF THEN B EXCMCHMG
0111233 01 001233 154764 ------ 0111217      -002-       15              BC       EXCMCHMG
0111234                                                  16         RETURN   1
0111234 01 001234 056441 ------              -001-       17         BTSAGN   1
```

```
                                -002- 01        *
                                -002- 02        *       INITIALIZE OFF-LINE CC AND POSSIBLY BEGIN EXECUTION OF AN
                                                          OFF-LINE PROGRAM
                                -002- 04        *       ----------------------------------------------------------------
                                                         ----------
                                -002- 06        *
                    07  * DESCRIPTION:
                    08  * INITIALIZE OFF-LINE CC AND START IT EXECUTING AT A GIVEN ADDRESS
                    09  *
                    10  * ENTRY POINT:
                    11  * EXCOFLPG
                    12  * INIT_OCC
                    13  *
                    14  * ENTRY CONDITIONS:
                    15  * RA1 = STARTING ADDRESS OF OFF-LINE PROGRAM (EXCOFLPG ONLY)
                    16  *
                    17  * EXIT CONDITIONS:
                    18  * SEE EXIT CONDITIONS FOR SUBROUTINE EXCMCH


0111235                                 22 EXCOFLPG
0111235 01 001235 103401 142561         23          LI      R0,SARIXT*E(8)!ARXF # FETCH FIRST OP
0111237 01 001237 053003 ------ 0111242 24          B       EXCOFLMG


0111240                                 28 INIT_OCC
0111240 01 001240 103401 170360         29          LI      R0,NOPX             # EXTRA ORDER IS NOT REQUIRED

0111242                                 31 EXCOFLMG                             # SPECIAL ENTRY POINT USED ONLY BY CBLM
0111242                                 32                                      # R0=SS_RXT*E(8)!ARX, R15=ES(ISC1,ISC2)
0111242                                 33          BEGIN
0111242 01 001242 171420 ------ -002-   34          HA
0111243 01 001243 006100 ------         35          LR      R4,R0               # SAVE ORDER TO BE EXECUTED BETWEEN TABLES
0111244 01 001244 003441 004620         36          LI      R2,LDMCHB*E(4)      # MCH ORDER TO BUFFER ADDRESS IN MCHB
0111246 01 001246 016056 000017         37          IRM     R2,RA1,MSK(4)       # MOVE ADDRESS INTO POSITION FOR EXCMCHO
0111250 01 001250 006077 ------         38          LR      R3,RA1+1
0111251 01 001251 031420 111266 0111266 39          LAL     R1,OFLPGTBL,RA1     # RA1=ADDRESS OF ORDER TABLE, R1=LENGTH OF
                                                                                  TABLE
0111253                                 41          CALL    EXCMCHO
0111253 01 001253 037020 111224 0111224 -001- 42    BSA     EXCMCHO
0111255                                 43          IF      CF THEN RGBEGIN     # DO SECOND HALF ONLY IF FIRST HALF SUCCEEDED
0111255 01 001255 155010 ------ 0111265 -002- 44        BNC     IFS663
0111256 01 001256 031420 111331 0111331 45              LAL     R1,OFLPGTBL1,RA1
0111260 01 001260 003441 000720         46              LI      R2,LDMIRL*E(4)  # EXECUTE MICRO INSTRUCTION BETWEEN TABLES
0111262 01 001262 006064 ------         47              LR      R3,R4           # POSITION MICRO INSTRUCTION
0111263                                 48              CALL    EXCMCHO
0111263 01 001263 037020 111224 0111224 -001- 49        BSA     EXCMCHO
```

```
   INITIALIZE OFF-LINE CC AND POSSIBLY BEGIN EXECUTION OF AN OFF-LINE PROGRAM                    0:40:27   2/06/81  ****

                                                                                                  CSYSUB          W77D

0111265                                          01          RGEND
0111265                                 -001-    02 IFS663
0111265                                          03      RETURN
0111265 01 001265 156420 ------         -001-    04      BTSAG



0111266                                          10 OFLPGTBL                          # USED BY EXCOFLPG
                                                 11 # THE SEQUENCE OF THE FOLLOWING ORDERS IS VERY IMPORTANT.
                                                 12 # THE OFF-LINE CC MUST BE STOPPED AND THE MS REGISTER ZEROED BEFORE THE
                                                 13 # LDMIRL ORDER IS GUARANTEED TO WORK. THIS CAN BE DONE WITH DIRECT MCH
                                                 14 # ORDERS. THE CC FLIP-FLOP MUST BE CLEARED BEFORE THE PT CAN
                                                 15 # BE RESET. TO PROTECT AGAINST THE POSSIBILITY OF THE PT ALREADY
                                                 16 # CONTAINING A TIMED-OUT VALUE, THE BTC FLIP-FLOP IS SET BEFORE
                                                 17 # THE CC FLIP-FLOP IS CLEARED. ALL ERROR SOURCES MUST BE CLEARED
                                                 18 # BEFORE THE MCH INITIALIZATION SEQUENCER IS CLEARED (VIA IDSWQ CROSSPOINT).
                                                 19 # THE MAIN MEMORY SEQUENCER MUST BE INITIALIZED (BRXMMS) BEFORE THE MEMORY
                                                 20 # IS ACCESSED (L SARI,MCHB). THIS IS ALSO TRUE OF SETTING THE DR (SDR).
                                                 21 # BIN SHOULD NOT BE RESET (L SS_R,MCHB) UNTIL THE IM HAS BEEN LOADED
                                                 22 # BECAUSE TRANSIENTS IN THE CLEAR AND GATE MAY PRIME AN INTERRUPT.
                                                 23 # THE REMAINING INITIALIZATION MAY OCCUR ANYWHERE BEFORE THE FREEZE (LDMAR).
                                                 24 # THE ER AND THE BHC FLIP-FLOP MUST BE CLEARED AFTER THE
                                                 25 # FREEZE SINCE IT IS POSSIBLE FOR THIS OPERATION TO GENERATE
                                                 26 # SPURIOUS ERRORS. THIS IS POSSIBLE FOR THE ER SINCE A
                                                 27 # DIRECT MCH ORDER EXISTS TO PERFORM THIS OPERATION. HOWEVER,
                                                 28 # THE BHC CANNOT BE CLEARED AFTER THE FREEZE AND HENCE
                                                 29 # MUST BE LEFT SET BY THIS SUBROUTINE. IF DESIRED, IT
                                                 30 # MUST BE CLEARED BY EXECUTING CODE IN THE OTHER CC.
                                                 31 # THE MSTART MUST OF COURSE BE THE LAST ORDER.
0111266 01 001266 000021 ------                   32          DATA    ENTRIES(OFLPGTBL)
0111267 01 001267 001520 000000                  33          ADDR    0,CLMSR              # CLEAR MAINTENANCE STATE REGISTER
0111271 01 001271 006420 000000                  34          ADDR    0,MSTOP              # STOP OCC, MUST BE DONE BEFORE ANY LMIRL
0111273 01 001273 000720 016466                  35          ADDR    IMTC%,LDMIRL         # CLEAR DECODER MAINTENANCE STATES
0111275 01 001275 000720 130631                  36          ADDR    AR%T*E(8)!MCHB%F,LDMIRL # SAVE STARTING ADDRESS
0111277 01 001277 004620 000016                  37          ADDR    ES(BHC,BIN,BTC),LDMCHB # BLOCK ERRORS WHILE INITIALIZING AND
                                                                                              FREEZING
0111301 01 001301 000720 105631                  39          ADDR    SS_S%T*E(8)!MCHB%F,LDMIRL
0111303 01 001303 000720 015471                  40          ADDR    SDR%,LDMIRL
0111305 01 001305 004320 007777                  41          ADDR    X(FFF),LDMIRH
0111307 01 001307 000720 145330                  42          ADDR    ZI%,LDMIRL
0111311 01 001311 000720 146330                  43          ADDR    ZOPF%,LDMIRL
0111313 01 001313 004620 030260                  44          ADDR    ES(BDSR1,BDSR0,REV1,RW1,RW0),LDMCHB # INIT FOR MMSR (NO ISOLATE
                                                                                              OR UPDATE)
0111315 01 001315 000720 070631                  46          ADDR    BR%T*E(8)!MCHB%F,LDMIRL # NEED TO GO THROUGH BR TO GET TO MMSR
0111317 01 001317 000720 145312                  47          ADDR    BRXMMS%,LDMIRL
0111321 01 001321 004620 111326 0111326          48          ADDR    HALT,LDMCHB          # POINT PA AT A HALT INSTRUCTION BECAUSE IT
                                                                                              WILL BE EXECUTED AFTER A PIE FROM AN
```

```
   INITIALIZE OFF-LINE CC AND POSSIBLY BEGIN EXECUTION OF AN OFF-LINE PROGRAM                0:40:27    2/06/81  ****

                                                                                                CSYSUB          M77D

                                                                                 INTERRUPT
0111323 01 001323 000720 113231                  02          ADDR    PA%T*E(8)!MCHB%F,LDMIRL
0111325 01 001325 004620 ------                  03          DATA    LDMCHB*E(4)          # SEND HALT OP-CODE TO BE EXECUTED
0111326                                          04 HALT
0111326 01 001326 056540 ------                  05          HALT                         # THE DATA AND HALT OPERATIONS FORM ONE
                                                                                           TABLE ENTRY
0111327 01 001327 000720 017231                  07          ADDR    SIR%T*E(8)!MCHB%F,LDMIRL # SIR='HALT'
                          0000041                08 ENTRIES(OFLPGTBL) EQU (*-OFLPGTBL-1)/2



0111331                                          12 OFLPGTBL1
0111331 01 001331 000015 ------                  13          DATA    ENTRIES(OFLPGTBL1)
0111332 01 001332 004620 042160 CINIT            14          ADDR    HGAREA+OFL_HG,LDMCHB # ALLOCATE 7 LEVELS TO OFF-LINE PROCESSING
0111334 01 001334 000720 032631                  15          ADDR    HG%T*E(8)!MCHB%F,LDMIRL # INIT HG REGISTER
0111336 01 001336 004637 157577 CINIT            16          ADDR    OFL_IM,LDMCHB
0111340 01 001340 000720 103631                  17          ADDR    IM%T*E(8)!MCHB%F,LDMIRL
0111342 01 001342 004635 034065                  18          ADDR    ES(CIPLTRK,BPC,PRIV,AME,BIN,DME,HLT,MINT,CC,REJ),LDMCHB
0111344 01 001344 000720 107231                  19          ADDR    SS_R%T*E(8)!MCHB%F,LDMIRL # ZERO SS CONTROL BITS
0111346                                          20                                       # ESSENTIAL BITS INCLUDE BIN,MINT,CC
0111346 01 001346 006120 000000                  21          ADDR    0,CLPT               # CLEAR POSSIBLE ERROR SOURCE BEFORE INIT
                                                                                           SEQUENCER
0111350 01 001350 004620 000010                  23          ADDR    ES(BTC),LDMCHB
0111352 01 001352 000720 107231                  24          ADDR    SS_R%T*E(8)!MCHB%F,LDMIRL # RESET BTC NOW THAT PT IS ZEROED
0111354 01 001354 000720 026712                  25          ADDR    IDSW0%,LDMIRL        # CLEAR MCH INIT SEQUENCER
0111356 01 001356 002320 000037                  26          ADDR    CLNSTRT+1,LDMAR      # FREEZE STARTING MICRO PROGRAM ADDRESS
0111360 01 001360 003120 000000                  27          ADDR    0,CLER
0111362 01 001362 006220 000000                  28          ADDR    0,MSTART             # START THE OFF-LINE CC
                          0000025                29 ENTRIES(OFLPGTBL1) EQU (*-OFLPGTBL1-1)/2
```

```
                                -002- 01        *
                                -002- 02        *       TIME CHECK
                                -002- 03        *       ----------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * INDICATES WHEN A SPECIFIED PERIOD OF TIME HAS PASSED
                    07  * SINCE A COMPANION SUBROUTINE (SEE TIMOUT) WAS CALLED,
                    08  * IE, THE SPECIFIED NUMBER OF 25-MS INTERVALS OR MORE
                    09  * HAS OCCURRED.
                    10  *
                    11  * ENTRY POINT:
                    12  * TIMCHK
                    13  *
                    14  * ENTRY CONDITIONS:
                    15  * R0 = TIMOUT CONSTANT CONSTANT PREVIOUSLY GENERATED BY
                    16  * SUBROUTINE TIMOUT.  THIS SUBROUTINE SHOULD BE CALLED BY THE
                    17  * CHKTIM MACRO
                    18  *
                    19  *           EXAMPLES:      CHKTIM
                    20  *                       -1- CALL TIMCHK
                    21  *
                    22  *                           CHKTIM TSADDR=XX
                    23  *                       -1- LL R0,XX
                    24  *                       -1- CALL TIMCHK
                    25  *
                    26  * EXIT CONDITIONS:
                    27  * CF = 1 FOR NO TIME-OUT
                    28  * CF = 0 FOR TIME-OUT
                    29  *
                    30  * ACCURACY
                    31  * TIMOUT TAKES PLACE ONLY AFTER AT LEAST SPECIFIED PERIOD OF
                    32  * TIME HAS PASSED
                    33  * LET P = PERIOD OF TIME BETWEEN TIMOUT CHECKS, COMMONLY
                    34  * THE LENGTH OF A BASE LEVEL SCAN, THEN:
                    35  *           0<ERROR<P


0111364                                     39 TIMCHK
0111364                                     40         BEGIN   ()
0111364 01 001364 130420 043461 CTSD        41         LL      R1,SYSTIM
0111366 01 001366 005020 ------             42         SR      R1,R0           #   R1=SYSTIM'-(SYSTIM+TIMOUT+1)
0111367 01 001367 024037 ------             43         TBN     R1,15           #   HAS TIMOUT OCCURRED
0111370 01 001370 055002 ------ 0111372     44         BNC     TMOUT
0111371                                     45                                 #   TIMOUT HAS NOT OCCURRED, SET CF=1
0111371                                     46         RETURN  0
0111371 01 001371 056460 ------     -001-   47         BTSAN   0
0111372                                     48 TMOUT                           #   TIMOUT HAS OCCURRED, SET CF=0
0111372                                     49         RETURN  1
```

TIME CHECK 0:40:27 2/06/81 ****

CSYSUB W77D

0111372 01 001372 156461 ------ -001- 01 BTSAN 1

```
SET UP TIME-OUT CONSTANT                                                    0:40:27   2/06/81  ****
                                                                                      CSYSUB        W77D

                                    -002- 01        *
                                    -002- 02        *       SET UP TIME-OUT CONSTANT
                                    -002- 03        *       ------------------------
                                    -002- 04        *
                          05  * DESCRIPTION:
                          06  * GENERATES A TIMING CONSTANT FOR USE BY A COMPANION
                          07  * SUBROUTINE (SEE TIMCHK).
                          08  *
                          09  * ENTRY POINT:
                          10  * TIMOUT---LOAD R0 FROM DATA WORD ASSEMBLED BY BGNTIM  MACRO + TIMOUTX
                          11  * TIMOUTX--ENTRY CONDITION AS STATED BELOW
                          12  *
                          13  * ENTRY CONDITIONS:
                          14  * R0 = NUMBER OF 25 MS INTERVALS DESIRED TO BE TIMED+1.
                          15  * THE +1 INSURES THAT THE TIMED INTERVAL IS NEVER
                          16  * FRACTIONALLY SHORTER THAN THE INTENDED TIME. THIS SUBROUTINE
                          17  * SHOULD BE CALLED BY THE BGNTIM MACRO.
                          18  *
                          19  *          EXAMPLES:     BGNTIM MIN=2, SEC=30
                          20  *                      -1- CALL TIMOUT
                          21  *                      -1- DATA 6001
                          22  *
                          23  *                      BGNTIM MSEC=200,TSADDR=XX
                          24  *                      -1- CALL TIMOUT
                          25  *                      -1- DATA 9
                          26  *                      -1- STL R0,XX
                          27  *
                          28  * THE CSADDR PARAMETER ON THE BGNTIM MACRO CAUSES THE
                          29  * TIMING CONSTANT TO BE STORED IN TEMPORARY STORE AS IN THE
                          30  * SECOND EXAMPLE.
                          31  * THE MINIMUM REQUESTED TIME IS 25 MS
                          32  * THE MAXIMUM REQUESTED TIME IS 13 MINUTES
                          33  *
                          34  * EXIT CONDITIONS:
                          35  * R0 = TIMING CONSTANT


0111373                                          39 TIMOUTX
0111373                                          40         BEGIN
0111373 01 001373 171420 ------          -002-   41         HA
0111374 01 001374 053010 ------ 0111404          42         B       TIMOUTMERGE

0111375                                          44 TIMOUT
0111375                                          45         ABEGIN
0111375 01 001375 171420 ------          -001-   46         HA
0111376                                          47         GRTNADR RA1
0111376 01 001376 072340 ------          -001-   48         GN      RA1,0
0111377 01 001377 072361 ------          -001-   49         GN      RA1+1,1
```

SET UP TIME-OUT CONSTANT


```
0111400 01 001400 040400 ------                    01        L       RO,0(RA1)          # GET CONSTANT
0111401 01 001401 041421 ------                    02        LA      R1,1(RA1)          # INCREMENT ADDRESS
0111402                                           03        HRTNADR RA1
0111402 01 001402 072740 ------           -001-   04        HN      RA1,0
0111403 01 001403 072761 ------           -001-   05        HN      RA1+1,1
0111404                                           06 TIMOUTMERGE
0111404                                           07        GETTI
0111404 01 001404 112400 ------           -001-   08        UNPK    TI
0111405 01 001405 006103 ------           -001-   09        LR      R4,R3
0111406 01 001406 012400 ------           -001-   10        UNPK    TI
0111407 01 001407 020103 ------           -001-   11        CR      R4,R3
0111410 01 001410 055774 ------ 0111404   -001-   12        BNC     TRY688
0111411 01 001411 003462 177400                   13        NI      R3,MSK(8,8)
0111413 01 001413 003460 152000 BLMMA             14        SI      R3,PTRESET
0111415 01 001415 010470 ------                   15        RRN     R3,8               # NUMBER OF 25-MS INTERVALS SINCE THE LAST
                                                                                       SYSTIM UPDATE
0111416 01 001416 030420 043461 CTSD              17        LL      R1,SYSTIM
0111420 01 001420 001423 ------                   18        AR      R1,R3
0111421 01 001421 001401 ------                   19        AR      RO,R1              #   RO=(SYSTIM+TIMOUT+1)
0111422                                           20        RETURN
0111422 01 001422 056420 ------           -001-   21        BTSAG
```

```
                                -002- 01        *
                                -002- 02        *       PRINT REPORT ERROR TTY MESSAGE
                                -002- 03        *       ------------------------------
                                -002- 04        *
                    05  * DESCRIPTION:
                    06  * PRINT A MESSAGE OF THE FOLLOWING FORM:
                    07  * REPT ERR WRD A B C D E F G
                    08  *
                    09  * ENTRY POINT:
                    10  * REPT _ERR
                    11  *
                    12  * ENTRY CONDITIONS:
                    13  * R6=TTY DICTIONARY WORD
                    14  * R7-R13=RAW DATA TO BE PRINTED
                    15  *
                    16  * EXIT CONDITIONS:
                    17  * NONE


0111423                                     21 REPT_ERR
0111423                                     22         BEGIN   ()
0111423                                     23         PRINT   FMT=(WRD(R,E,P,T),WRD(E,R,R),WRD,L_X,L_X,L_X,L_X,L_X,L_X,L_X,L_X)
                                                             ,PACTION=A

                                -001- 26 #  MESSAGE PROTOTYPE
                                -001- 27 #   A mm       REPT ERR WRD xxxx xxxx xxxx xxxx xxxx xxxx xxxx
0111423 01 001423 173053 ------ -002- 28        BSAI    PXMRY                   # SUBROUTINE PMRY IS IN PROGRAM TTYAPP
0111424 01 001424 101200 ------ -002- 29        VFD     1,1 2,0 1,0 3,1 1,0 1,1 1,0 2,0 1,0 3,0
0111425 01 001425 063140 ------ -002- 30        VFD     4,TTYO_L_X 4,TTYO_L_X 4,TTYO_L_X 4,TTYO_L_X 4,TTYO_WRD
0111426 01 001426 063146 ------ -002- 31        VFD     4,TTYO_L_X 4,TTYO_L_X 4,TTYO_L_X 4,TTYO_L_X 4,TTYO_L_X
0111427 01 001427 010033 ------ TTYTBL -002- 32 VFD     5,2 11,RXEPT
0111430 01 001430 000307 ------ TTYTBL -002- 33 VFD     5, 11,EXRR
                                -001- 34        NOTE    THE VARIABLE PORTION OF THE OUTPUT MESSAGE TO BE PRINTED IS
                                                          CONTAINED IN GENERAL REGISTERS R6,R7,R8,R9,R10,R11,R12,R13,
0111431                                     36         RETURN
0111431 01 001431 156400 ------ -001- 37        BTSA
                                    38 OUT IOD CHL=MTC ALM=* CONVERT=Y
                                    39 RMV INT n
                                    40 T"02"
                                    41 % This message reports that 30 interrupts have
                                    42 occurred during 1 base level scan. The number
                                    43 of the last interrupt is identified, the theory
                                    44 being that this is the one that is stuck and
                                    45 causing the excessive amount of interrupts. As
                                    46 a result of this message, the indicated interrupt
                                    47 is blocked from happening again by being set to 1
                                    48 in the interrupt mask register (IM). %
                                    49 T"03"
```

```
                    01   n  this is the number of the suspected stuck interrupt
                    02 T"04"
                    03    try to determine the reason for the stuck interrupt
                    04 T"05"
                    05   PR-1C956 CSYSUB
                    06 .IODEND
0111431             07        INDEXGEN
```

```
-003- 01        *
-003- 02        *
-003- 03        *
-003- 04        *
```

		ADDRESS	WORD COUNT
-001- 08 #	SECTION TITLE		
-001- 09 #	BCD TO BINARY CONVERSION	000000	19
-001- 10 #	BINARY TO BCD CONVERSION	000023	39
-001- 11 #	CONVERT BCD ZERO	000072	19
-001- 12 #	16 OR 20 BIT ADDS AND SUBTRACTS	000115	31
-001- 13 #	20 BIT COMPARE	000154	22
-001- 14 #	INTERRUPT BEGIN AND END ROUTINES	000202	57
-001- 15 #	UNLOAD AND LOAD IO CHANNEL STATE	000273	43
-001- 16 #	RANGE CHECK ADDRESS	000346	32
-001- 17 #	TURN OFF WRITE PROTECT OF STORE	000406	29
-001- 18 #	INITIALIZE MASC INCLUDING WRITE PROTECT	000443	101
-001- 19 #	BEGIN OR STOP STORE UPDATE	000610	10
-001- 20 #	UNLOAD AND LOAD MAINTENANCE CHANNEL STATE	000622	37
-001- 21 #	UPDATE OFF-LINE TEMPORARY STORE FROM ON-LINE	000667	3
-001- 22 #	COPY OFF-LINE TEMPORARY STORE TO ON-LINE	000672	3
-001- 23 #	ZERO TEMPORARY STORE	000675	29
-001- 24 #	MULTIPLE STORE CLEAR OR PATTERN WRITE SUBROUTINE	000732	8
-001- 25 #	MULTIPLE LOAD SUBROUTINES	000742	22
-001- 26 #	MOVE BLOCK IN STORE	000770	5
-001- 27 #	MULTIPLE STORE SUBROUTINES	000775	22
-001- 28 #	SEND AND TEST IO	001023	14
-001- 29 #	SEND IO ORDER AND RETRY ON FAILURE	001041	25
-001- 30 #	SEND AND TEST MCH	001072	10
-001- 31 #	TEST MCH STATE	001104	28
-001- 32 #	SEND AND TEST BACKUP MAINTENANCE CHANNEL	001140	19
-001- 33 #	SYNCHRONIZE BASE LEVEL WITH INTERRUPTS	001163	18
-001- 34 #	DETERMINE CURRENTLY ACTIVE INTERRUPT	001205	9
-001- 35 #	EXECUTE A SERIES OF MCH ORDERS	001216	15
-001- 36 #	INITIALIZE OFF-LINE CC AND POSSIBLY BEGIN EXECUTION OF AN OFF-LINE PROGRAM	001235	87
-001- 37 #	TIME CHECK	001364	7
-001- 38 #	SET UP TIME-OUT CONSTANT	001373	24
-001- 39 #	PRINT REPORT ERROR TTY MESSAGE	001423	7

```
-001- 43 # THE TOTAL LENGTH OF THIS ASSEMBLY IS 00794
```

```
01 CSYSUB MAXSIZE 0,1432
```

```
PATCH HISTORY                                                                0:40:27   2/06/81  ****

LISTING OF INDIVIDUAL PATCHES                                                CSYSUB          W77D

      */*/*/*/011711/*/*/*/*     -002- 01        PBEGIN  PROG=CSYSUB                    TRNO=11711  SERNOB=64948
                                        02 # IMPLEMENT A HARD INIT ENTRY INTO THE INITST SUBROUTINE
                                        03 # TO BE USED WHEN A BOOTSTRAP IS IN PROGRESS.
                                        04 # THIS ENTRY IS USED BY CINIT.
                                        05 # THIS PATCH COORDINATES WITH TC 63274 TR 12279
0111431                                 06        TCEND
                                    -001- 07        NOTE    ************************************************************************




      */*/*/*/013874/*/*/*/*     -002- 14        PBEGIN  PROG=CSYSUB                    TRNO=13874  SERNOB=51309
                                        15 # WHEN A STUCK INTERRUPT IS PROCESSED BY THE INTERRUPT
                                        16 # HANDLER THE ORIGINAL CONTENTS OF R0 AND R1 ARE NOT
                                        17 # RESTORED TO THE INTERRUPTED PROGRAM.
0111431                                 18        TCEND
                                    -001- 19        NOTE    ************************************************************************



0111431                                 26        END
```

```
   PATCH HISTORY                                                                                    0:40:27    2/06/81  ****

     VALUE  T  NAME        DEF/REF    ATTRIBUTES AND REFERENCES                                        CSYSUB          M77D

   10163524 S .STOP
    0115247 L %%%213        23-22  23-17
    0110237 L %%%215        23-32  23-27
    0000201 A %BITCNT               1-08
          1 J %BOP                  1-08
    0026677 A %CHKTR%       33-49
    0000001 A %CLAS                 LIBNUM=10       1-08
    0000002 A %MAXWRD               LIBNUM=10       1-08
'CSYSUB'    T %NAME%
    0000000 A %ORG%2
          0 J %OW%           1-10
          0 J %PFT%
'()'        T %SAVREGS
    0000010 A %TA1%         23-13  24-08, 24-34, 34-25
          0 J %TCHEAD%       1-10
'PRLINE 1,1,
'   --------
-----------
-----------
-----------
-----------
-----------
-----------
-----------
-----------
-----------
----------'T %US%
''---------  T %USING12
''          T %USING14
    0000002 A %WRDCNT               LIBNUM=10       1-08
   CTVTAB   V rgchkAdr              LIBNUM=12      31-41
         14 P rgchkAdr%_%C
             SYSUB                  LIBNUM=12
    0000002 A AA%                   LIBNUM=10       1-08
    0110115 L ADD16         17-23   4-01
    0110116 L ADD20         17-27   4-02
         17 R AME                   W=1  S=0  N=0  CL=1  LIBNUM=6       69-18
    0000161 A AR%F                  LIBNUM=6       67-23
    0000261 A AR%T                  LIBNUM=6       68-36
         16 R BAS_ADR       45-34   45-48
          0 J BB%                   1-08
    0110000 L BCDXBIN       11-42   4-03
    0110007 L BCDXBINLP     12-05   12-18
          4 R BDSR0                 W=1  S=14  N=0  CL=1  LIBNUM=6      38-22, 68-44
          4 R BDSR1                 W=1  S=15  N=0  CL=1  LIBNUM=6      38-22, 68-44
         17 R BHC                   W=1  S=1  N=0  CL=1  LIBNUM=6       68-37
         17 R BIN                   W=1  S=2  N=0  CL=1  LIBNUM=6       24-29, 58-27, 68-37, 69-18
    0110023 L BINXBCD       13-26   4-04
'X-74292 THR

   COMMON SYSTEM SUBROUTINES                                                                        PR-1C956-50

    0:40:27   2/06/81  TRADE SECRET - SEE TRADE SECRET RESTRICTIVE NOTICE ON COVER SHEET   CSYSUB    ISSUE 05      PAGE    79
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```
    PATCH HISTORY                                                                                    0:40:27    2/06/81  ****

      VALUE  T  NAME       DEF/REF    ATTRIBUTES AND REFERENCES                                          CSYSUB          W77D

U X-74298
       IV-C
MAY,1973'     T BOTTTL
     0110715 L BPAXORG       44-08  41-24, 42-25, 43-37
          17 R BPC                  W=1  S=22  N=0  CL=1  LIBNUM=6       58-29, 69-18
     0000161 A BRXT                 LIBNUM=6        38-26, 40-24, 40-38, 68-46
     0145312 A BRXMMS%              LIBNUM=6        38-28, 68-47
          17 R BTC                  W=1  S=3  N=0  CL=1  LIBNUM=6       68-37, 69-23
          17 R CC                   W=1  S=14  N=0  CL=1  LIBNUM=6      69-18
           4 R CFSAV         9-03   W=1  S=0  N=0  CL=1   22-04, 22-17, 22-24, 25-09
           4 R CFSAVR        8-02    9-03
     0110725 L CHKINDEX      44-32  43-49, 44-15, 44-22
     0000000 A CIPLTRK        2-10  S=23     2-11, 69-18
     0000145 A CLER                 LIBNUM=6        69-27
     0000065 A CLMSR                LIBNUM=6        68-33
     0000036 A CLNSTRT              LIBNUM=6        69-26
     0000305 A CLPT                 LIBNUM=6        69-21
     0110734 L CLR_WRDS      45-39   4-06
     0110732 L CLR_16        45-37   4-05
     0110154 L CMPR20        19-24   4-07
     0110025 L CONCON        13-30  13-34




   ¢.<(+!&
        !$*);
-‾/         ;
,%_>?
    :#@'=" ab
cdefghi ¬¢(+
+ jklmnopqr^
 ¤)±¤-/stuvw
xyz÷¦¬[≥•012
3456789†/┐]≠
-{abcdefghi
      }jklmno
pqr       \ s
tuvwxyz
 0123456789
     '        T CONLC              LIBNUM=12
'n



    z

    COMMON SYSTEM SUBROUTINES                                                                        PR-1C956-50
     0:40:27   2/06/81  TRADE SECRET - SEE TRADE SECRET RESTRICTIVE NOTICE ON COVER SHEET   CSYSUB   ISSUE 05     PAGE    80
```

```
   PATCH HISTORY                                                                                    0:40:27    2/06/81  ****

     VALUE  T  NAME       DEF/REF    ATTRIBUTES AND REFERENCES                                          CSYSUB          W77D

   (e<hp!x
       v$fgs
¬al        !
i%_>k
  jo#b'd" ab
cdefghi n≤(+
† jklmnopqr^
 ¤)±¤-¬stuvw
xyz+└┌[≥•012
3456789†┘┐]≠
-(ABCDEFGHI
     )JKLMNO
PQR       \ S
TUVWXYZ
 0123456789
     '         T CONSC              LIBNUM=12
           2 R CONST        13-22   13-37, 13-43, 14-01, 14-04, 14-06, 14-17, 14-20
     0110046 L CONTIN       13-48   13-44
     0111432 L CPATCH        1-36   33-49
     0112562 L CPATCH1       1-37
     0114107 L CPATCH2       1-38
     0115073 L CPATCH3       1-39   23-17
     0121236 L CPATCH7       1-40
     0000063 A CRXF                 LIBNUM=6        58-38
     0000063 A CRXT                 LIBNUM=6        58-34
     0110000 L CSYSUB        1-31



   (.<(+!&
        !$¤);
¬-/        !
,%_>?
   :#@'="
         n≤(+
†         ^
 ¤)±¤-¬
    •└┌[≥•012
3456789†┘┐]≠
-(ABCDEFGHI
     )JKLMNO
PQR       \ S
TUVWXYZ
 0123456789
     '         T DELLC              LIBNUM=12
           7 R DIGIT5       13-25   13-29, 13-33, 14-12
```

```
   PATCH HISTORY                                                                                    0:40:27   2/06/81  ****

     VALUE  T  NAME        DEF/REF    ATTRIBUTES AND REFERENCES                                          CSYSUB          W77D

        17 R DME                    W=1  S=4  N=0  CL=1  LIBNUM=6       69-18
   0110063 L DOHUND         14-16   14-05
   0110070 L DOROTAT        14-21   14-18
   0110066 L DOTEN          14-19   14-07
   0110420 L DOWP           32-01   31-45
   0110740 L DOWRITE        45-48   45-45
         0 U E
   TTYTBL    X EXRR         74-33   74-33
   CINIT     V ERPMCH        6-41
   CINIT     V ERRPRTCK      6-42
         0 J ESS2           1-10
         1 J ESS2E          1-09
   0111216 L EXCMCH         65-44    4-08
   0111225 L EXCMCHLP       66-04   65-50
   0111217 L EXCMCHMG       65-47   66-15
   0111224 L EXCMCHO        66-01    4-09, 35-02, 67-42, 67-49
   0111242 L EXCOFLMG       67-31    4-10, 67-24
   0111235 L EXCOFLPG       67-22    4-11
         1 J FIELD          1-09
   0110672 L GET_OTS        42-22    4-12
   0110720 L GET_OTSLP      44-19   42-25
   0110353 L GTSTRLIM       29-36   29-30
   0111326 L HALT           69-04   68-48
   0000065 A HGXF                   LIBNUM=6        25-04
   0000065 A HGXT                   LIBNUM=6        25-08, 69-15
           V HGAREA          6-04   69-14
        17 R HLT                    W=1  S=5  N=0  CL=1  LIBNUM=6       69-18
   TTYTBL    X IXNT         24-03    24-03
   0154330 A IDLMCHX                LIBNUM=6        59-06
   0026712 A IDSWQX                 LIBNUM=6        69-25
'ILLEGAL CON
DITIONAL IN
THE IF MACRO'T IFERROR1
'DATA > 0 OR
 DATA < 0 IS
 MEANINGLESS
, USE DATA ¬
= 0'          T IFERROR2
'TWO CONSTAN
TS ARE BEING
 COMPARED IN
 IF MACRO'    T IFERROR3
'AN ITEM WAS
 COMPARED TO
 SOMETHING O
THER THAN A
CONSTANT'     T IFERROR4
'DESTINATION
 OF AN = STA

   COMMON SYSTEM SUBROUTINES                                                                        PR-1C956-50
    0:40:27   2/06/81  TRADE SECRET - SEE TRADE SECRET RESTRICTIVE NOTICE ON COVER SHEET   CSYSUB    ISSUE 05      PAGE    82
```

```
     VALUE  T  NAME       DEF/REF    ATTRIBUTES AND REFERENCES                                                    CSYSUB          W77D

TEMENT IS A
CONSTANT'     T IFERROR5
'ATTEMPTING
TO SET ITEM
= TO SOMETHI
NG OTHER THA
N A CONSTANT'T IFERROR6
'ITEM MAY ON
LY USE THE =
 AND ~= COND
ITIONALS'     T IFERROR7
     0110107 L IFS149        16-05  16-03
     0110165 L IFS180        19-34  19-32
     0110171 L IFS184        19-40  19-38
     0110175 L IFS188        19-46  19-44
     0110201 L IFS192        20-03  20-01
     0110276 L IFS252        26-41  26-39
     0110303 L IFS258        26-49  26-47
     0110307 L IFS261        27-06  27-04
     0110371 L IFS294        30-01  29-48
     0110374 L IFS296        30-06  30-04
     0110405 L IFS299        30-16  30-14
     0110442 L IFS319        32-27  32-25
     0110472 L IFS342        34-38  34-36
     0110512 L IFS344        35-07  34-44
     0110516 L IFS357        35-13  35-11
     0110537 L IFS362        35-41  35-39
     0110542 L IFS367        35-46  35-44
     0110565 L IFS372        36-20  36-14
     0111032 L IFS522        53-06  53-04
     0111035 L IFS525        53-11  53-09
     0111131 L IFS577        59-01  58-48
     0111146 L IFS594        60-37  60-35
     0111155 L IFS598        60-49  60-47
     0111230 L IFS646        66-09  66-07
     0111265 L IFS663        68-02  67-44
          14 R IM                   LIBNUM=6       22-36, 22-44, 23-40, 24-32, 64-22
     0000207 A IMXT                 LIBNUM=6       69-17
    CTSD     V IM_IMAGE       6-30  23-25, 64-25
     0016466 A IMTCX                LIBNUM=6       68-35
           4 R INDEX         13-24  13-41, 13-47, 14-02
     0000040 A INDEXCNTR     10-48  12-23, 14-24, 17-01, 19-01, 20-06, 25-13, 28-27, 30-19, 32-30, 37-05, 38-35, 40-45, 41-26,
                                    42-27, 44-39, 46-02, 48-29, 49-29, 51-29, 53-16, 55-39, 57-03, 59-11, 61-10, 63-07, 64-35,
                                    66-18, 69-30, 71-02, 73-22, 75-08

'BCD TO BINA
RY CONVERSIO
N'            T INDEXTITLE1
'INITIALIZE
MASC INCLUDI
```

```
NG WRITE PRO
TECT'          T INDEXTITLE10
'BEGIN OR ST
OP STORE UPD
ATE'           T INDEXTITLE11
'UNLOAD AND
LOAD MAINTEN
ANCE CHANNEL
 STATE'        T INDEXTITLE12
'UPDATE OFF-
LINE TEMPORA
RY STORE FRO
M ON-LINE'     T INDEXTITLE13
'COPY OFF-LI
NE TEMPORARY
 STORE TO ON
-LINE'         T INDEXTITLE14
'ZERO TEMPOR
ARY STORE'     T INDEXTITLE15
'MULTIPLE ST
ORE CLEAR OR
 PATTERN WRI
TE SUBROUTIN
E'             T INDEXTITLE16
'MULTIPLE LO
AD SUBROUTIN
ES'            T INDEXTITLE17
'MOVE BLOCK
IN STORE'      T INDEXTITLE18
'MULTIPLE ST
ORE SUBROUTI
NES'           T INDEXTITLE19
'BINARY TO B
CD CONVERSIO
N'             T INDEXTITLE2
'SEND AND TE
ST IO'         T INDEXTITLE20
'SEND IO ORD
ER AND RETRY
 ON FAILURE'   T INDEXTITLE21
'SEND AND TE
ST MCH'        T INDEXTITLE22
'TEST MCH ST
ATE'           T INDEXTITLE23
'SEND AND TE
ST BACKUP MA
INTENANCE CH
ANNEL'         T INDEXTITLE24
'SYNCHRONIZE
```

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    PATCH HISTORY                                                                                    0:40:27    2/06/81  ****

      VALUE  T  NAME       DEF/REF    ATTRIBUTES AND REFERENCES                                          CSYSUB          M77D

 BASE LEVEL
WITH INTERRU
PTS'           T INDEXTITLE25
'DETERMINE C
URRENTLY ACT
IVE INTERRUP
T'             T INDEXTITLE26
'EXECUTE A S
ERIES OF MCH
 ORDERS'       T INDEXTITLE27
'INITIALIZE
OFF-LINE CC
AND POSSIBLY
 BEGIN EXECU
TION OF AN O
FF-LINE PROG
RAM'           T INDEXTITLE28
'TIME CHECK'   T INDEXTITLE29
'CONVERT BCD
 ZERO'         T INDEXTITLE3
'SET UP TIME
-OUT CONSTAN
T'             T INDEXTITLE30
'PRINT REPOR
T ERROR TTY
MESSAGE'       T INDEXTITLE31
''             T INDEXTITLE32
'16 OR 20 BI
T ADDS AND S
UBTRACTS'      T INDEXTITLE4
'20 BIT COMP
ARE'           T INDEXTITLE5
'INTERRUPT B
EGIN AND END
 ROUTINES'     T INDEXTITLE6
'UNLOAD AND
LOAD IO CHAN
NEL STATE'     T INDEXTITLE7
'RANGE CHECK
 ADDRESS'      T INDEXTITLE8
'TURN OFF WR
ITE PROTECT
OF STORE'      T INDEXTITLE9
     0110040 L INIT          13-40  14-23
     0111240 L INIT_OCC      67-28   4-13, 33-39, 34-12, 35-40
           5 R INITH          9-21 W=1  S=2  N=0  CL=1   34-02, 34-29
     0110443 L INITOST       33-37   4-16
     0110447 L INITST        33-42   4-14
     0112123 L INITSTH       34-01   4-15

    COMMON SYSTEM SUBROUTINES                                                                        PR-1C956-50

     0:40:27   2/06/81  TRADE SECRET - SEE TRADE SECRET RESTRICTIVE NOTICE ON COVER SHEET   CSYSUB    ISSUE 05      PAGE    85
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PATCH HISTORY                                                                                    0:40:27    2/06/81  ****

     VALUE  T  NAME        DEF/REF    ATTRIBUTES AND REFERENCES                                          CSYSUB          W77D

     0110463 L INITSTLOOP    34-22  35-36
           5 R INITSTO        9-20 W=1  S=1  N=0  CL=1   33-40, 33-43, 34-02, 35-43
     0111163 L INSYNC        62-30   4-17
     0111166 L INSYNCLP      62-35  63-01
     0110207 L INTBEGIN      22-21   4-19
     0110202 L INTBGNX       22-01   4-20
     0111205 L INTCHK        64-20   4-18
    CTSD     V INTCNT         6-32  22-13
     0110253 L INTEND        24-27   4-21
    CTSD     V INTRCORD       6-31  22-25
     0110260 L INTRST        24-38  24-11
     0016750 A IOCC%                LIBNUM=6        61-07
     0110332 L IOLODMG       28-09  27-49
           1 R IOMSGR         8-08   9-35,  9-37
     0110326 L IOMTC         28-02  27-38
     0110321 L IONORM        27-42  27-37
     0111060 L IORETRY       55-14  55-36
     0111044 L IOSEND        54-39  54-35
     0111055 L IOTEST        55-08  54-43
     0000003 A IOWAIT        10-33  52-46
     0000066 A IS_RXT               LIBNUM=6        22-47
           4 R ISO0                 W=1  S=12  N=0  CL=1  LIBNUM=6       38-22
           4 R ISO1                 W=1  S=13  N=0  CL=1  LIBNUM=6       38-22
     0000115 A LDMAR                LIBNUM=6        69-26
     0000231 A LDMCHB               LIBNUM=6        34-46, 37-02, 56-30, 67-36, 68-37, 68-44, 68-48, 69-03, 69-14, 69-16, 69-18,
                                    69-23
     0000215 A LDMIRH               LIBNUM=6        68-41
     0000035 A LDMIRL               LIBNUM=6        37-01, 37-03, 56-36, 67-46, 68-35, 68-36, 68-39, 68-40, 68-42, 68-43, 68-46,
                                    68-47, 69-02, 69-07, 69-15, 69-17, 69-19, 69-24, 69-25
     0025730 A LDPAR%               LIBNUM=6        40-26, 40-40
     0134072 A LDSTMCH%             LIBNUM=6        56-47
     0110556 L LDWPREGLP     36-09  36-28
     0110567 L LDWPREGMERGE  36-25  36-18
          14 R LENGTH         9-51 W=14  S=4  N=0  CL=1          44-04, 44-05
     0000000 A LINECNT
     0110311 L LODIOC        27-29   4-23
     0110643 L LODMCH        40-12   4-24
'CFSAVR'     T LONAM_CFSAV
'OFLSTR'     T LONAM_INITH
'OFLSTR'     T LONAM_INITST
             O
'STBLKR'     T LONAM_LENGTH
'IOMSGR'     T LONAM_MTCIO
'MCHORDER'   T LONAM_NOLDTR
'OFLSTR'     T LONAM_OFLSTI
             NIT
'IOMSGR'     T LONAM_SPLIO
     0110042 L LOOP          13-42  14-02
    TDATA    V LSTTSWRD       6-08

COMMON SYSTEM SUBROUTINES                                                                        PR-1C956-50

  0:40:27   2/06/81  TRADE SECRET - SEE TRADE SECRET RESTRICTIVE NOTICE ON COVER SHEET   CSYSUB    ISSUE 05      PAGE    86
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PATCH HISTORY 0:40:27 2/06/81 ****

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  VALUE  T  NAME          DEF/REF    ATTRIBUTES AND REFERENCES                                                    CSYSUB        W77D

 0110742 L L2_V           47-38   4-37
 0110753 L L2_10          48-04   4-33
 0110752 L L2_11          48-02   4-34
 0110751 L L2_12          47-49   4-35
 0110750 L L2_13          47-47   4-36
 0110766 L L2_2           48-25   4-25, 48-20
 0110762 L L2_3           48-18   4-26
 0110761 L L2_4           48-16   4-27
 0110760 L L2_5           48-14   4-28
 0110757 L L2_6           48-12   4-29
 0110756 L L2_7           48-10   4-30
 0110755 L L2_8           48-08   4-31
 0110754 L L2_9           48-06   4-32
      15 R MANI                   W=1  S=15  N=0  CL=1  LIBNUM=6       22-43
CBLM     V MAS_OOS         6-23   60-33
MASACS   V MAS_ZERO        6-15   44-28
 0006061 A MASCINIT        10-40  34-23
 0000361 A MASCINITH       10-41  34-37
MASACS   V MASCIOSC         6-16  34-19, 34-39
 0006060 A MASCUNBK        10-42  35-12
MASACS   V MASOFFON         6-13  44-21
MASACS   V MASONOFF         6-14  44-14
CBLM     V MCH_OOS          6-24  59-08
       3 R MCHB                    LIBNUM=6       39-28, 39-29, 39-31, 39-38, 39-39, 39-41
 0000231 A MCHB%F                  LIBNUM=6       37-01, 37-03, 68-36, 68-39, 68-46, 69-02, 69-07, 69-15, 69-17, 69-19, 69-24
 0000341 A MCHC%T                  LIBNUM=6       56-45
       0 R MCHCP                   W=1  S=0  N=0  CL=1  LIBNUM=6       58-45
       0 R MCHER                   W=1  S=1  N=0  CL=1  LIBNUM=6       58-45
CTSD     V MCHFCN          6-33   60-42
       2 R MCHORDER        8-14   10-18
       0 R MCHTR                   LIBNUM=6       40-17, 40-33, 66-08
 0026472 A MCHTRXMCHB%             LIBNUM=6       39-37, 40-28
 0164071 A MD1CHTN%                LIBNUM=6       27-48
 0164072 A MD2CHTM%                LIBNUM=6       28-08
 0164074 A MD3CHC%                 LIBNUM=6       28-21
 0074072 A MD6RAIO%                LIBNUM=6       28-18
```

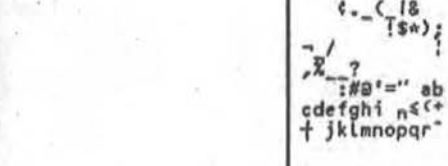

PATCH HISTORY 0:40:27 2/06/81 ****

VALUE T NAME DEF/REF ATTRIBUTES AND REFERENCES CSYSUB W77D

```
 M)IM-~stuvW
XYZ+└┌[≥⊕012
3456789↑↓┐]≠
-(ABCDEFGHI
    )JKLMNO
PQR     \ S
TUVWXYZ
 0123456789
    '
```

```
          T MICODETR            LIBNUM=6
         17 R MINT              W=1  S=13  N=0  CL=1  LIBNUM=6      69-18
    0111053 L MIOSEND       55-04  54-47
    0110772 L MOVST         49-25   4-38
    0110770 L MOVSTLP       49-22  49-26
    0000215 A MS%T                 LIBNUM=6        37-03
    0000311 A MSTART               LIBNUM=6        69-28
    0000321 A MSTOP                LIBNUM=6        36-41, 68-34
          1 R MTCIO          9-35 W=1  S=0  N=0  CL=1   54-42, 55-07, 55-16
    0111065 L MTCRETRY      55-23  55-17
    0111067 L MTCRTN        55-33  55-12
    0110146 L NODEC         18-31  18-29
          2 R NOLDTR        10-18 W=1  S=14  N=0  CL=1          66-06
    0170360 A NOP%                 LIBNUM=6        67-29
    0000360 A NOP%F                LIBNUM=6        58-34
   CINIT    V OFL_HG         6-43  69-14
   CINIT    V OFL_IM         6-44  69-16
    0111266 L OFLPGTBL      68-10 ENTRIES=21      67-39, 68-32, 69-08
    0111331 L OFLPGTBL1     69-12 ENTRIES=15      67-45, 69-13, 69-29
          5 R OFLSTINIT      9-17 W=1  S=0  N=0  CL=1   33-40, 34-13, 34-18, 34-29, 34-43, 35-38, 36-13
          5 R OFLSTR         8-05   9-17,  9-20,  9-21
    0110436 L OFLWP         32-20  32-10
```

```
  ¢.<<(AON
      X$*);
¬S/       :
,%_>?
   :#@'L" ab
cdefghi nε(+
† jklmnopqr^
 M)IM-~stuvW
XYZ+└┌[≥⊕012
3456789↑↓┐]≠
-(IBCLEFGHI
    )JKLMNO
PQR     \ S
```

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    PATCH HISTORY                                                                                                    0:40:27    2/06/81  ****

      VALUE  T  NAME        DEF/REF    ATTRIBUTES AND REFERENCES                                                        CSYSUB          W77D

LLLWLYZ
 0123456789
     '         T OPTR
     0000325 A ORG_000154    23-23
     0000323 A ORG_000235    23-13
     0000345 A ORG_000252    24-08
     0000353 A ORG_000257    24-34
     0000521 A ORG_000465    34-25
     0000511 A ORG_000471    34-01
     0110577 L OSTTBL        36-39 ENTRIES=4       34-49, 36-40, 37-04
    CTVTAB   V PXMRY                LIBNUM=12      23-47, 74-28
          14 P PXMRYX_XTTYA
               PP                 LIBNUM=12
     0000226 A PAXT                LIBNUM=6       69-02
     0000001 A PAGECNT
     0000062 A PAGL          2-10
     0110272 L PIERTN        25-11   4-22
    TTYAPP   V PMRY          23-47  74-28
     0000000 A PRIV           2-12 S=20     2-13, 69-18
    BLMMA    V PTRESET        6-06  73-14
           1 R PTRN          45-32  45-42, 45-48
           0 U R
    TTYTBL   X RXEPT          74-32  74-32
    TTYTBL   X RXMV           24-02  24-02
          14 P RA0                   LIBNUM=3       19-27, 29-37, 29-38, 30-07, 30-09, 32-07, 32-08, 34-39, 34-40, 34-41, 35-04,
                                      36-08, 36-10, 43-47, 43-48, 43-51, 43-52, 49-23
          16 P RA1                   LIBNUM=3       17-31, 17-33, 17-35, 17-36, 17-37, 17-38, 17-39, 18-27, 18-28, 18-30, 18-32,
                                      18-33, 18-34, 18-35, 19-28, 22-25, 22-27, 22-30, 22-31, 23-03, 23-25, 23-39, 32-07, 32-08,
                                      32-15, 32-22, 34-49, 36-16, 36-23, 43-47, 43-48, 43-51, 43-52, 45-34, 47-48, 48-01, 48-03,
                                      48-05, 48-07, 48-09, 48-11, 48-13, 48-15, 48-17, 48-19, 48-26, 49-24, 50-48, 51-01, 51-03,
                                      51-05, 51-07, 51-09, 51-11, 51-13, 51-15, 51-17, 51-19, 51-26, 59-07, 59-08, 60-42, 60-44,
                                      61-03, 65-48, 65-49, 67-37, 67-38, 67-39, 67-45, 72-48, 72-49, 73-01, 73-02, 73-04, 73-05
     0110366 L REGSUB        29-45  29-41
          17 R REJ                   W=1  S=15  N=0  CL=1  LIBNUM=6       69-18
     0111423 L REPT_ERR      74-21   4-39
           1 R RESULT        13-21  13-38, 13-47, 14-10, 14-11, 14-22
           4 R REV1                 W=1  S=7  N=0  CL=1  LIBNUM=6        38-22, 68-44
     0110351 L RGCHKADR      29-32   4-41
     0110346 L RGCHK32       29-26   4-40
' POSITION 0
F SAVED CF I
N INTERRUPT' T RMK_CFSAV
' INITH=1 ME
ANS ENTRY PO
INT WAS INIT
STH'         T RMK_INITH
' INITSTO=1
MEANS ENTRY
POINT WAS IN


    COMMON SYSTEM SUBROUTINES                                                                                        PR-1C956-50

      0:40:27   2/06/81  TRADE SECRET - SEE TRADE SECRET RESTRICTIVE NOTICE ON COVER SHEET   CSYSUB    ISSUE  05      PAGE    89
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     VALUE  T  NAME       DEF/REF    ATTRIBUTES AND REFERENCES                                                CSYSUB          W77D

ITST'        T RMK_INITSTO
' LENGTH OF
BLOCK'       T RMK_LENGTH
' MTC MESSAG
E IS BEING S
ENT'         T RMK_MTCIO
' LEAVE THE
MCHTR 0 INCL
UDING PARITY'T RMK_NOLDTR
' OFLSTINIT=
0 MEANS ENTR
Y POINT WAS
WPST'        T RMK_OFLSTINI
               T
' SPECIAL IO
,MTC RESPONS
E SHOULD NOT
 BE  TREATED
 AS AN ERROR
.'           T RMK_SPLIO
           4 R RW0                W=1  S=4  N=0  CL=1  LIBNUM=6       38-22, 68-44
           4 R RW1                W=1  S=5  N=0  CL=1  LIBNUM=6       38-22, 68-44
           0 R R0                 LIBNUM=3       12-07, 12-15, 12-17, 13-31, 13-36, 13-39, 13-43, 13-46, 13-49, 14-11, 14-12,
                                   15-48, 15-49, 16-01, 16-04, 17-25, 17-30, 17-35, 17-39, 18-21, 18-26, 18-32, 18-35, 19-30,
                                   19-31, 19-36, 19-37, 19-42, 19-43, 19-48, 19-49, 22-34, 23-23, 24-39, 27-33, 27-34, 28-13,
                                   28-14, 29-29, 29-35, 29-40, 31-42, 32-04, 32-05, 33-40, 33-43, 33-46, 34-02, 34-13, 34-18,
                                   35-31, 35-32, 36-08, 36-10, 38-22, 40-19, 45-31, 47-40, 49-23, 49-24, 49-26, 50-40, 52-46,
                                   53-12, 55-09, 56-30, 56-36, 58-41, 58-45, 59-07, 61-01, 62-49, 64-25, 64-26, 64-29, 64-30,
                                   66-11, 67-23, 67-29, 67-35, 70-42, 73-01, 73-19
     0000123 A R0%F               LIBNUM=6       38-26, 40-24, 56-45
     0000123 A R0%T               LIBNUM=6       58-38
           1 R R1                 LIBNUM=3        8-08, 11-47, 12-07, 12-12, 12-14, 12-15, 12-16, 12-17, 12-19, 15-29, 15-36,
                                   16-01, 16-08, 17-33, 18-28, 22-35, 23-24, 24-40, 26-45, 27-02, 28-15, 30-07, 30-09, 30-12,
                                   32-04, 34-39, 34-49, 43-42, 45-32, 47-40, 47-41, 47-42, 49-23, 49-24, 50-40, 50-41, 50-42,
                                   61-01, 64-22, 64-24, 64-26, 64-30, 65-50, 67-39, 67-45, 70-41, 70-42, 70-43, 73-02, 73-17,
                                   73-18, 73-19
          12 R R10                LIBNUM=3       28-15, 34-23, 34-37, 35-12, 35-33, 48-05, 51-05
          13 R R11                LIBNUM=3       26-45, 27-02, 48-03, 51-03
          14 R R12                LIBNUM=3        8-11, 19-30, 19-37, 48-01, 51-01
          15 R R13                LIBNUM=3       19-42, 19-49, 47-48, 50-48
          16 R R14                LIBNUM=3       19-31, 19-36, 29-42, 30-02, 30-08, 30-09, 36-04, 36-05, 36-10, 36-26, 44-03
          17 R R15                LIBNUM=3       19-43, 19-48, 29-46, 30-11, 30-12, 32-02, 32-06, 36-06
           2 R R2                 LIBNUM=3        8-14, 12-04, 12-10, 12-12, 15-44, 16-06, 17-32, 17-34, 17-36, 22-26, 22-40,
                                   23-33, 23-41, 23-42, 25-05, 29-37, 29-39, 29-43, 29-49, 30-02, 31-32, 31-38, 32-09, 34-46,
                                   39-30, 39-32, 39-34, 39-40, 39-42, 40-15, 40-18, 40-19, 40-31, 40-34, 44-03, 44-04, 44-05,
                                   44-06, 48-26, 51-26, 58-23, 58-29, 58-43, 60-32, 60-33, 60-41, 60-42, 62-32, 63-03, 65-48,
                                   66-10, 66-11, 67-36, 67-37, 67-46
     0000126 A R2%F               LIBNUM=6       22-47, 25-08, 40-38
     0000126 A R2%T               LIBNUM=6       25-04
```

PATCH HISTORY 0:40:27 2/06/81 ****

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  VALUE  T  NAME          DEF/REF    ATTRIBUTES AND REFERENCES                                                    CSYSUB        W77D

      3  R  R3                       LIBNUM=3        12-03, 12-09, 12-10, 15-46, 15-49, 16-07, 16-08, 22-25, 22-26, 22-27, 22-36,
                                                      22-37, 22-42, 22-43, 22-44, 23-25, 23-33, 23-39, 23-40, 24-31, 24-32, 29-38, 29-46, 32-02,
                                                      32-03, 32-05, 34-48, 39-33, 40-16, 40-32, 48-19, 51-19, 58-24, 58-26, 58-27, 58-44, 62-33,
                                                      62-45, 62-47, 62-49, 63-04, 65-49, 67-38, 67-47, 73-09, 73-11, 73-13, 73-14, 73-15, 73-18
      4  R  R4                       LIBNUM=3         8-02, 12-01, 12-18, 22-04, 22-17, 22-24, 22-39, 22-40, 22-41, 22-42, 24-37,
                                                      25-09, 34-19, 34-20, 34-21, 34-40, 34-41, 35-10, 35-36, 35-47, 35-48, 36-01, 36-02, 36-04,
                                                      36-31, 39-34, 40-15, 40-31, 43-42, 44-33, 48-17, 51-17, 62-34, 62-45, 62-47, 63-05, 67-35,
                                                      67-47, 73-09, 73-11
      5  R  R5                       LIBNUM=3         8-05, 11-47, 12-19, 39-33, 40-16, 40-32, 41-24, 42-25, 43-37, 44-07, 48-15,
                                                      51-15
      6  R  R6                       LIBNUM=3        23-42, 35-48, 36-28, 36-29, 43-45, 43-46, 44-35, 44-36, 48-13, 51-13
      7  R  R7                       LIBNUM=3        48-11, 51-11
     10  R  R8                       LIBNUM=3        48-09, 51-09
     11  R  R9                       LIBNUM=3        28-14, 34-40, 34-41, 34-48, 35-04, 48-07, 51-07
 0000151  A  R9%T                     LIBNUM=6        37-01
CTVTAB    V  S%MCH                    LIBNUM=12       66-13
     14  P  S%MCH%_%CSYS
            UB                       LIBNUM=12
CTVTAB    V  S%MIO                    LIBNUM=12       55-06, 55-25
     14  P  S%MIO%_%CSYS
            UB                       LIBNUM=12
 0000305  A  SARI%T                   LIBNUM=6        67-23
 0111140  L  SBUMCH          60-29     4-42
 0015471  A  SDR%                     LIBNUM=6        68-40
 0110525  L  SELF            35-32
 0110516  L  SENDINIT        35-15     35-05
 0111041  L  SENDIO          54-33     4-43
 0111043  L  SENDIOS         54-37     4-44
 0111050  L  SENDMIO         54-45     4-45
 0111052  L  SENDMIOS        55-01     4-46
 0001316  A  SERNO_051309    78-15
 0001312  A  SERNO_064948    78-02
 0111025  L  SIO             52-42     4-47, 54-41, 55-19
 0000036  A  SIR%T                     LIBNUM=6        69-07
 0111072  L  SLDMCHB         56-29     4-48
 0111075  L  SLDMIRL         56-35     4-49
 0110032  L  SMALLER         13-35     13-32
 0111077  L  SMCH            56-40     5-01, 56-31
 0111023  L  SMIO            52-38     5-02
       1  R  SPLIO            9-37 W=1  S=1  N=0  CL=1   54-34, 54-38, 54-46, 55-02, 55-35
'E%RR'     T  SPWORD
      17  R  SS                       LIBNUM=6        58-25
      17  R  SS_R                     LIBNUM=6        58-42
 0000216  A  SS_R%T                   LIBNUM=6        69-19, 69-24
      15  R  SS_S                     LIBNUM=6        58-30
 0000213  A  SS_S%T                   LIBNUM=6        24-30, 68-39
      14  R  STBLKR           8-11     9-51
 0134330  A  STMCH%                   LIBNUM=6        56-49
 0110677  L  STMERGE         43-41     41-25, 42-26
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COMMON SYSTEM SUBROUTINES PR-1C956-50

PATCH HISTORY 0:40:27 2/06/81 ****

```
  VALUE  T  NAME          DEF/REF    ATTRIBUTES AND REFERENCES                    CSYSUB        M77D

  CBLM   V  STOPPSAU       6-22   38-32
   0110610 L  STPSTUPD     38-19    5-03
  TDATA   V  STRLIM         6-09   29-37, 35-47
   0110235 L  STUCKINT     23-10   22-15
   0110775 L  ST2_V        50-38    5-16
   0111006 L  ST2_10       51-04    5-12
   0111005 L  ST2_11       51-02    5-13
   0111004 L  ST2_12       50-49    5-14
   0111003 L  ST2_13       50-47    5-15
   0111021 L  ST2_2        51-25    5-04, 51-20
   0111015 L  ST2_3        51-18    5-05
   0111014 L  ST2_4        51-16    5-06
   0111013 L  ST2_5        51-14    5-07
   0111012 L  ST2_6        51-12    5-08
   0111011 L  ST2_7        51-10    5-09
   0111010 L  ST2_8        51-08    5-10
   0111007 L  ST2_9        51-06    5-11
   0110135 L  SUB16        18-19    5-17
   0110136 L  SUB20        18-23    5-18
   0000000 A  SV_REG
  CTSD    V  SYSTATE        6-34   59-07, 60-32
  CTSD    V  SYSTIM         6-35   70-41, 73-17
   0110705 L  TBLLOOP      43-50   44-33
         3 R  TEMP         13-23   13-39, 13-46, 13-49
   0110072 L  TENZERO      15-27    5-19, 11-46
   0111026 L  TESTIO       52-45    5-20, 52-40
   0111027 L  TESTIOLP     53-01   53-12
   0116774 L  TFAPCH2        1-42
         0 R  TI                   LIBNUM=6       62-44, 62-46, 73-08, 73-10
   0111364 L  TIMCHK       70-39    5-21
   0111375 L  TIMOUT       72-44    5-22
   0111404 L  TIMOUTMERGE  73-06   72-42
   0111373 L  TIMOUTX      72-39    5-23
   0111104 L  TMCH         58-21   39-44
   0016730 A  TMCH%                 LIBNUM=6       58-36
   0111372 L  TMOUT        70-48   70-44
'3A-CC COMMO
N SYSTEM INT
ERFACES'       T  TOPTTL
   0600000 L  TPATCH         1-44
   0001312 A  TR_011711    78-02
   0001316 A  TR_013874    78-15
   0000521 A  TR_11711     34-01   34-25
   0000353 A  TR_13874     23-13   23-23, 24-08, 24-34
   0110465 L  TRORG        23-13   24-08, 24-34, 34-25
   0111172 L  TRY614       62-44   62-48
   0111404 L  TRY688       73-08   73-12
         0 U  TTYAPP
   0000002 A  TTYO_                 LIBNUM=10      23-49, 24-01
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PATCH HISTORY 0:40:27 2/06/81 ****

VALUE	T	NAME	DEF/REF	ATTRIBUTES AND REFERENCES
0000004	A	TTYO_DEC		LIBNUM=10 23-49
0000006	A	TTYO_L_X		LIBNUM=10 74-30, 74-31
0000000	A	TTYO_WRD		LIBNUM=10 74-30
0000002	A	TTYOCNT	24-02	74-32
0	U	TTYTBL		
0110056	L	UNITS	14-09	
0110273	L	UNLODIOC	26-34	5-24
0110622	L	UNLODMCH	39-26	5-25
0110413	L	UNWPMERGE	31-39	31-33
0110406	L	UNWPOST	31-29	5-26
0110411	L	UNWPST	31-35	5-27
0110667	L	UPD_OTS	41-21	5-28
0110715	L	UPDATELP	44-12	41-24
0110453	L	WPOST	34-10	5-30
0110451	L	WPST	33-45	5-29
0110531	L	WPSTERR	35-35	35-03
0110551	L	WPSTLOOP	36-03	36-31
0110456	L	WPSTMERGE	34-15	33-41, 33-44, 33-47, 34-03
TDATA	V	WPTBL	6-11	30-07, 36-08
0	R	WRD_CNT	45-31	45-37, 45-45, 45-48
0110735	L	WRT_PTRN	45-45	5-31, 46-01
0000322	A	YTXF		LIBNUM=6 24-30
0110675	L	ZERO_TS	43-34	5-33
0110075	L	ZEROTEN	15-34	5-32
0110101	L	ZEROTENLP	15-47	16-06
0145330	A	ZIX		LIBNUM=6 68-42
0026750	A	ZMINTX		LIBNUM=6 38-30, 40-30, 40-42, 57-02, 58-40
0146330	A	ZOPFX		LIBNUM=6 68-43
0110076	L	ZTMERGE	15-40	15-30
0110723	L	ZTS_ENTRY	44-26	43-37
1	J	3ACC	1-09	

PATCH HISTORY 0:40:27 2/06/81 ****

COUNT	FLAG	PAGE-LINE OF FLAG
8	E	22-36, 32-15, 32-22, 36-16, 36-23, 60-44, 61-03, 64-22

CSYSUB W77D

8 FLAG(S) FOUND IN THIS ASSEMBLY